The Pan-Pacific Entomologist

Vol. III, No. 4 April, 1927

BEES OF THE GENERA AGAPOSTEMON AND AUGOCHLORA IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES

BY T. D. A. COCKERELL

The brilliant green bees belonging to these genera are among the most attractive in our fauna.

Genus Agapostemon (Guérin) F. Smith

Agapostemon coloradensis Crawford, 1901

Females. *Utah:* Salt Lake City, July 1 (Van Duzee); Mount Timpanogos, 8-9000 feet, June 6 (Van Dyke).

Agapostemon virescens (Fabricius)

The names *nigricornis* (Fabricius), *vitreus* (Harris) and *bicolor* Robertson refer to the same species.

Females. *New York:* Ithaca, September 15 (Van Dyke); *Utah:* Garfield, June 28 (Van Duzee); *Oregon:* Corvallis, June 11 (Van Duzee).

Agapostemon martini Cockerell, n. sp.

Female (type). Length about or nearly 11 mm.; head and thorax emerald green with white pubescence; abdomen black with very broad and conspicuous bands of creamy white tomentum. Closely allied to *virescens* (Fabr.), but the hind tibiæ have no band of dark fuscous hair on outer side, and the posterior truncation of metathorax lacks the well-defined transverse ridges. The base of the mandibles is black or almost so, instead of dull yellow. The basal hair on first abdominal segment is much more dense. The anterior margin of the clypeus is entirely black.

Male. Superficially like *A. virescens* but differing thus: green of head and thorax yellower, the face golden green; hair of face and thorax above tinged with fulvous; scape yellow with a black stripe behind; anterior and middle femora entirely yellow; trochanters yellow; venter of abdomen mainly yellow, last segment not keeled apically. The moderately stout hind femora are toothed below.

Type, female, No. 2461, Mus. Calif. Acad. Sci., collected by J. O. Martin, August 2, 1924, at **Patagonia, Arizona.** *Paratypes:* Baboquivari Mountains, Arizona, O. C. Poling (presented by C. L. Fox), females August 18, October, males, August 10, 18, 20.

AGAPOSTEMON MELLIVENTRIS Cresson

Females. *California:* Palm Springs, March 25 (J. O. Martin); Coachella, May (Van Duzee). Males. *California:* San Pedro, October 25 (G. R. Pilate); Needles, November and December (J. A. Kusche). The San Pedro males have the black bands on abdomen averaging broader than in those from Needles. The latter are typical of the species.

AGAPOSTEMON SPLENDENS Lepeletier

Females. *Ohio:* Cedar Point, Sandusky, June 30 (Van Duzee).

Agapostemon epichryseus Cockerell, n. sp.

Male. Size and general appearance of *A. digueti* Ckll., differing thus: head and thorax above with abundant erect light golden hair; face broader; clypeus shorter; antennæ more robust and moniliform, black above, beneath yellowish ferruginous with the bases of the joints dusky; mesothorax densely granular, dull; base of metathorax bluer green, shorter and more rugulose; nervures darker; wings dusky at apex; middle and hind tibiæ with well-defined brown bands on basal part; abdomen with five yellow bands, separated by equally broad black ones; base of first segment black, but at extreme base with two large reddish yellow spots; venter orange with reddish bands, no special structural characters. Hind femora simple.

Type, male, No. 2462, Mus. Calif. Acad. Sci., collected by Albert Koebele in Morelos, Mexico, and presented to the Academy by Mr. W. M. Giffard.

This is certainly distinct from the closely allied *A. digueti* and *A. melliventris.* In Vachal's table it comes nearest to *A. leunculus* (Vachal), but that has the basal half of the first abdominal segment all black, and nothing is said of any reddish or golden hair above. Also our insect has the hind coxæ bright green above, not black. It also appears to resemble *A. sulfuripes* Friese from Costa Rica, but that really belongs to a different group with metallic color on abdominal bands and the hair whitish. The color of the dorsal pubescence suggests that this may be the male of *A. vulpicolor* Crawford from

Costa Rica, but the latter has duskier wings and the first recurrent nervure much nearer the end of second cubital cell.

AGAPOSTEMON COCKERELLI Crawford

Females. *Arizona:* Baboquivari Mountains, July 10, August 5 and 20 (O. C. Poling); two miles east of Oracle, July 24 (Van Duzee); fourteen miles east of Oracle, July 27 (J. O. Martin). *Utah:* King Station, Davis County, July 24 (Van Duzee).

Males. The male has not been described, but I refer here two specimens collected in *Arizona:* Baboquivari Mountains, August (O. C. Poling), and *Utah:* Zion National Park (Argus Mountain, Woodberry). The Arizona one has the yellow band on clypeus with pointed projection above, lacking in the Utah specimen. The latter may possibly be distinct.

This male is very like several others and especially allied to *A. cyanozonus* Ckll. The salient characters are: Head and thorax emerald green with pure white hair; scape black with yellow line or stripe in front; flagellum yellowish ferruginous beneath, black above; fourth antennal joint not quite as long as second and third combined; mesothorax excessively densely punctured, dullish; base of metathorax rugose but without well-defined plicæ, a median triangle bluer green than the rest; coxæ green; trochanters black (or first four with a little yellow); all femora and tibiæ with black marks, small but distinct on outer side of hind tibiæ; hind femora moderately stout, toothed; wings hyaline, second cubital cell broader than high. Abdomen with five yellow bands, the black bands between as broad as the yellow, posteriorly more or less blue; venter yellowish with strong reddish suffusion, first segment with green in middle apically emarginate; fourth with a thickened black curved callus, interrupted in middle; last without keel. The dorsal pubescence on apical segments light.

In Crawford's table this runs to *A. texanus* Cresson except that the hind tibiæ are not heavily marked with black. This is a variable character, but *A. cockerelli* does not have the large green triangular space on fourth ventral segment seen in *texanus*. The latter is also a larger insect.

AGAPOSTEMON VANDYKEI (Cockerell)

Females. *California:* Yosemite Valley, June 8 (Van Dyke); Carrville, Trinity County, July 6 (Van Dyke). I described this as a race of *A. texanus,* but I think it may stand as a distinct species.

AGAPOSTEMON ANGELICUS Cockerell

This species, described from Angel de la Guarda Island, Gulf of California, proves to have a wide range, even to Santa Fé, New Mexico.

Females. *Arizona:* Douglas, May 15 (J. I. Carlson); two miles east of Oracle, July 24 (Van Duzee); Warren, Cochise County, June 7 (J. I. Carlson); Prescott, June 7 (J. A. Kusche). *New Mexico:* Santa Fé, July 21 (Van Dyke); Santa Fé Cañon, July 23 (Van Dyke).

Males. The male has not been described. I refer here, not without some hesitation, the following specimens: *Arizona:* Grand Cañon, July 26 (Van Dyke). *Utah:* Saltair, July 12 (Van Duzee). *California:* Needles, December 11 (J. A. Kusche).

The male has the mesothorax green, granular and dullish, as in males of ***texanus***. The Grand Cañon one is a little larger and has the scape wholly black, whereas the others have a yellow line on the scape. Male ***A. californicus*** varies in the scape in the same manner. The trochanters are black suffused with green (especially the hind ones) and the hind tibiæ have a dark mark on outer side, characters of ***A. fasciatus*** Crawf., but that has the scape entirely yellow in front and the first abdominal segment yellow basally instead of broadly black as in the male now described. ***A. fasciatus*** also has the abdominal bands black, whereas they are posteriorly blue in the present form. There are five yellow bands on abdomen; pubescence of apical segment light; hind femora of the moderately thickened type, with tooth; last ventral segment without median carina, except a faint one, not apical, in Grand Cañon specimen; yellow band on clypeus with evident dentiform angle above.

These characters together exclude the species from Crawford's table, but it falls close to *A. texanus,* as the male of *A. angelicus* should. The rugæ at base of metathorax are not as distinct as in female *A. angelicus*. The latter, however, is variable and some specimens approach *A. texanus*. Perhaps *A. angelicus* is to be regarded as a subspecies of *A. texanus,* but if the male is correctly referred it seems to emphasize the distinctness.

AGAPOSTEMON BOREALIS Crawford, 1901

Females. *Washington:* Seattle, June 19 (Van Duzee). The dorsal thoracic hair varies from distinctly yellow to practically

white. The separation of this species from *texanus subtilior* becomes difficult, and I am not sure that *A. borealis* is really a distinct thing. There seems to be no essential difference in the base of the metathorax, nor in size. The single type of *borealis* was rather large (12 mm.).

AGAPOSTEMON TEXANUS Cresson

Females. *Arizona:* Chiricahua Mountains, Cochise County, March 26 (V. W. Owen). *Utah:* Heber, July 5 (Van Duzee); Salt Lake City, June 9 (Van Dyke), June 25, July 23 (Van Duzee).

AGAPOSTEMON TEXANUS SUBTILIOR Cockerell

Females. *Utah:* Logan, July 14, (Van Duzee); Vivian Park, July 7 (Van Duzee). *Oregon:* Hood River, June 12 (Van Dyke).

This form was described in Entomological News, ix (1898), p. 27, from Washington State. It looks distinct when compared with typical *A. texanus,* but in the Rocky Mountain region intermediates occur so that it is difficult to say where *subtilior* leaves off and *texanus* begins. It is thus the weakest of the *A. texanus* segregates, unless the male can be shown to differ in its structural characters. From Eldora, Colorado, I have what I regard as male *A. texanus subtilior,* and in Psyche, 1910, p. 244, I have given the differences from *A. texanus.*

AGAPOSTEMON RADIATUS Say

Females. *Colorado:* North Cheyenne Cañon, Colorado Springs, June 27 (Van Dyke), unusually slender. *New York:* Ithaca, July 14 (Van Dyke).

In Entomological News, ix, p. 27, I note: "Mr. Kincaid sent eighteen examples of *A. radiatus,* all from Pasco (Washington). The Pasco examples are larger and bluer than the Illinois form of *radiatus.*" These supposed *radiatus* were undoubtedly *A. femoratus* Crawford, not then described.

AGAPOSTEMON FEMORATUS Crawford

Crawford describes this from Washington, California, and Idaho. As he does not indicate which is the type locality I will designate **Palo Alto, California.**

Males. *California:* Huntington Lake, Fresno County, 7000 feet, July 4-24 (Van Duzee); Stockton, August 29 (Van

Duzee); hills back of Oakland, August 2 (Van Dyke).

Females. *California:* Panoche Cañon, Fresno County, April 29 (Van Dyke); Diablo, May 13 (Van Duzee); Bradley, April 20 (Van Duzee); Panoche Hills, Merced County, April 29 (Van Dyke); Alameda County foothills (W. M. Giffard); Dulzura, San Diego County, April 10 (J. I. Carlson); Huntington Lake, July 8 and 16 (Van Duzee). *Oregon:* Warner Mountains, Lake County, June 20, 21 (Van Dyke). *Idaho:* Payette, June 29 (Van Dyke). A yellower green than the Oregon specimens, the color practically as in *A. radiatus,* but size of *A. femoratus.*

The female is larger and usually bluer than in *A. radiatus,* but would hardly be considered a different species but for the distinct male with remarkably swollen hind femora. Crawford reports *A. radiatus* from California, but no particulars are given.

AGAPOSTEMON CALIFORNICUS Crawford

Crawford does not specify the type locality; I choose from those he cites **Pacific Grove, California.** His supposed female of this species from Moscow, Idaho, is something else, perhaps a form of *A. femoratus.* The true female is very close to *A. texanus.* The male has a very blue thorax.

Males. *California:* Pacific Grove, September (Blaisdell); Mesa Grande, Sonoma County, July 14 (Blaisdell); Tomales Bay, September 9 (Van Dyke); Santa Monica, September (F. C. Clark); San Francisco, September 8 (Van Duzee); Millbrae, September 1 (Van Dyke, Blaisdell); hills back of Oakland, August 2 (Van Dyke, Giffard); Carmel, August 20 (L. S. Slevin); Santa Barbara (Giffard); Alameda (Koebele); Concord (Ethel Crumb).

Females. *California:* Claremont (C. H. Muzzall); Cayton, Shasta County, July 9 (Van Duzee); Colton, May 26-28 (Van Duzee); Pismo, April 25 (Van Duzee); Needles, December 11 (J. A. Kusche); Mesa Grande, Sonoma County, July 14 (Blaisdell); Carmel, August, September (L. S. Slevin); Atascadero, April 26 (Van Duzee); Millbrae, September 1 (Van Dyke); Santa Monica (F. C. Clark); Bradley, May 22 (Van Duzee); Pebble Beach, May 27 (Van Dyke); Stone Cañon, Monterey County, April 27 (Van Duzee); Laguna Mountains,

San Diego County, August (Van Duzee); hills back of Oakland, August 2 (Van Dyke, Giffard); Alameda, May 12 (Van Duzee); Santa Barbara foothills (Giffard). The females differ greatly in color, some being much bluer than others, but all seem to be one species.

The following key will facilitate the separation of the above species:

Females 1
Males, abdomen banded with black and yellow 8
1. Abdomen fulvous ..... *melliventris* Cresson
—. Abdomen black 2
—. Abdomen green 4
2. Large (12-14 mm. long); wings brownish ..... *coloradensis* Crawford
—. Smaller (about 11 mm.) 3
3. Hind tibiæ with a band of dark fuscous hair on outer side, ... *virescens* Fabricius
—. Hind tibiæ without such band of dark hair (for other characters see description) ..... *martini* Cockerell
(*A. fasciatus* Crawf. from Nebraska and South Dakota is not in the Academy collection. It is readily separated from the above by the yellow apical band on female clypeus. *A. nasutus* Smith, from Mexico also has such a band.)
4. Abdomen with brassy and coppery tints ..... *vandykei* Cockerell
—. Abdomen without brassy or coppery tints 5
5. Mesothorax finely and closely punctured, the punctures more or less of two sizes 6
—. Mesothorax rugulose or coarsely punctured, the punctures not of two sizes 7
6. Mesothorax highly polished, shining; base of metathorax with very distinct plicæ after the manner of *A. radiatus* (New Mexico, Arizona) ..... *angelicus* Cockerell
—. Mesothorax shining; hair of thorax above usually ochraceous (Washington, B. C.) ..... *borealis* Crawford
—. Mesothorax shining; hair of thorax above not ochraceous; base of metathorax granular or rugulose; abdomen with blue or purple tints (Washington, Oregon, Utah, Colorado) ..... *texanus subtilior* Cockerell
—. Mesothorax moderately shining; base of metathorax more distinctly sculptured than in the last, without any specialized triangular area; pubescence not ochraceous (Texas and Iowa to Washington and California) ..... *texanus* Cresson*

*Crawford's table of the A. texanus group is:
Base of metathorax with indications of a triangular enclosure, subtilior Ckll.
Base of metathorax without a triangular enclosure,
Pubescence white or griseous; smaller species, texanus Cress.
Pubescence ochraceous; larger species, borealis Crawf.

—. Mesothorax dull, granular (California to Idaho)..... *californicus* Crawford

7. Large rough form, about 12-15 mm. long (New Jersey to Florida, west to Colorado)..... *splendens* Lepeletier

—. Smaller form (10-12 mm.) with very distinct abdominal bands, (Colorado to Arizona)..... *cockerelli* Crawford

—. Size as in the last, but abdominal hair bands slight or lacking (Eastern states to Rocky Mountains)..... *radiatus* Say

—. Larger (about 12-14 mm.), usually bluer (Pacific coast and Idaho)..... *femoratus* Crawford

(Crawford adds that *splendens* and *cockerelli* have a triangle of finer lines on base of metathorax wanting in the other two.)

8. Small species with slender hind femora, not dentate below; scape entirely yellow in front..... 9

—. Mostly larger species, with stout femora; if small then femora dentate beneath and scape not all yellow in front.....10

9. Hair of thorax above fulvus (Mexico)..... *epichryseus* Cockerell

—. Hair of thorax above white (southern California to New Mexico) ..... *melliventris* Cresson

10. Scape broadly yellow in front, thorax emerald green.....11

—. Scape dark in front or with a yellow line; thorax nearly always bluer, or blue, when with yellow line on scape, the yellow band on clypeus with no upward projection in middle.....12

11. Hind femora extremely stout, oval..... *femoratus* Crawford

—. Hind femora not thus stout..... *martini* Cockerell

12. Hind tibiæ with no black mark on outer side; last ventral usually without a carina; small or smallish forms; thorax green..... *angelicus* Cockerell

—. Hind tibiæ with a black mark on outer side; thorax often blue 13

13. Thorax greener and abdomen largely yellow beneath..... ..... *cockerelli* Crawford

—. Thorax mostly blue or bluish..... *californicus* Crawford

Several species in the Academy collection are represented only by females. The following table, mainly based on that of Crawford, will be useful for the separation of the males of these species:

Hind femora greatly swollen or incrassate..... 1

Hind femora slightly or not swollen..... 2

1. Larger; hind femora about half as long as broad.... *splendens* Lep.

—. Smaller; hind femora nearly as broad as long..... *femoratus* Crawf.

2. Smaller, under 9 mm. long; scape of antennæ yellow or with a brown dot above..... *melliventris* Cress.

—. Larger, over 9 mm. long..... 3

3. Head and mesothorax above blue 4
—. Head and mesothorax above green; yellow band on clypeus more or less angulate above 5
4. Larger; yellow band on clypeus angulate ("toothed") above; no keel on last ventral segment ..... *coloradensis* Crawf.
—. Smaller; yellow band on clypeus not angulate above ..... *californicus* Crawf.
5. Abdomen with six yellow bands; pubescence on apical segments dark ..... *radiatus* Say
—. Abdomen with five yellow bands; pubescence on apical segments light 6
6. Last ventral segment with a median carina ..... *virescens* Fabr.
—. Last ventral segment without a median carina; anterior and intermediate trochanters yellow to black (golden green in *A. fasciatus* Crawf.) ..... *texanus* Cress.

Male *A. sulcatulus* Ckll. from Nebraska goes in the above table next to *A. melliventris,* but has the scape black with a broad yellow stripe in front. Disregarding size it would go to "5," but the band on clypeus is not angulate above. The dark callus on fourth ventral segment is entire, slightly arched; in *texanus* it is divided.

Female *A. pulcher* Smith, said to be from California, is said to be four lines long, entirely bright golden green, wings hyaline, legs rufotestaceous.

The genus *Agapostemon* is probably of South American origin, but it must have been in North America a long time. Its species or races seem to be rather vaguely defined, but possibly studies of the male genitalia would enable us to separate them more exactly. We need much more field work in order to correctly match the sexes, and determine the precise distribution of the various forms.

Genus Augochlora F. Smith

The type is *A. pura* (Say)

Augochlora ignita F. Smith

Mexico: Morelos (Koebele). Both sexes presented by Mr. W. M. Giffard. This differs from all others in the Academy collection by the crimson abdomen.

Augochlora fervida F. Smith

Kansas: Lawrence, May 7-14 (F. X. Williams). *Arizona:* Baboquivari Mountains, August (O. C. Poling), presented by Mr. C. L. Fox; very many, including both sexes.

AUGOCHLORA POMONIELLA Cockerell

California: Santa Cruz Island, May 16, several (Van Duzee); Mill Creek Cañon, San Bernardino Mountains, September 21 (Van Duzee); Sobobo Springs, Riverside County, June 4 (Van Duzee); Colton, May 26-28 (Van Duzee); Stone Cañon, Monterey Co., April 21 (Van Duzee).

The Mill Creek Cañon series includes males. The male is more slender than the female, about 8 mm. long; antennæ black, the flagellum obscurely reddish beneath; clypeus strongly produced, the lower margin dark reddish; tarsi dark; margins of ventral segments entire, the fifth with a median carina. It is larger and greener than the male of *A. neglectula* Ckll. and the basal area of metathorax is considerably longer. In a male *A. pomoniella* from Claremont the flagellum is more strongly reddened beneath.

CALIFORNIA MICROLEPIDOPTERA II*

BY H. H. KEIFER

ARISTOTELIA ARGENTIFERA Busck

In late February of this year small larvæ were noted boring in the overwintering tips of *Baccharis pilularis* DC. in Marin County. The young early spring larvæ bore just below the tip of the branch under the epidermis, involving the parenchyma, but little of the woody core. Young larvæ noted after the new spring growth had started were tying the terminal leaves. Later the borings are used only for retreat and dense silken tubes extend to the leaves which are skeletonized. Mature larvæ have abandoned the borings and are found in tubes, tying the new spring leaves. Pupation takes place in a rather loose web in the rearing jars. Adults emerging April 4, May 11 and May 16 prove the larvæ to belong to this species.

Full-grown larvæ about 8 mm. long: body yellow-green, generally mottled whitish; six full length dorsal longitudinal whitish stripes, much broken; overlaid brownish pink between white markings, darker dorsally. Head variable, clear brown to mottled fuscous; shield green to fuscous; hairs light fuscous.

Pupa 5 mm. long, greenish yellow and entirely pubescent; head blunt; abdomen tapering to a rather acute anal end; wing cases, antennæ and hind legs ending on anterior part of sixth abdominal segment; abdomen with three movable segments; hooked hairs surround a well-developed cremaster.

* Contribution from the California Academy of Sciences, No. 384.

MISCELLANEOUS STUDIES IN THE COLEOPTERA NO. 2

BY FRANK E. BLAISDELL, SR.

San Francisco, California

No. 1 of the present series appeared in the Canadian Entomologist, Vol. LIII, No. 6, June, 1921. The dermestid and melyriid described below constitute interesting additions to their respective families. The descriptions were drawn up several years ago and were intended to have been included in a larger faunal paper, the publication of which has been unavoidably delayed. On account of paratypes and specimens having been distributed under manuscript names it has become very important that the descriptions be published without further delay.

Perimegatoma giffardi Blaisdell, new species

Form elongate oval. Color black with cinereous markings; pubescence nigro-piceous in the dark areas and plumbo-cinereous elsewhere; elytra with a transverse band of paler hairs behind the middle, legs piceous, antennæ rufo-piceous.

Pubescence soft, moderately dense and subdecumbent; sparse and cinereous on the head, with blackish hairs intermixed on the middle two-fourths of the pronotum, laterally becoming denser and entirely cinereous; in the basal area of the elytra a few erect hairs are seen, while in the lateral fifths the hairs are paler and in the central three-fifths they are intermixed with blackish hairs, the former predominating; there is a narrow band of pale hairs at junction of the anterior and middle thirds, another at about the junction of the apical and middle thirds, both widen laterally as they meet the lateral pale area, and also become narrower and distinctly whitish in the central area; the suture is narrowly bordered with similar whitish hairs, this sutural line broadens toward apex as it joins the lateral pale areas, thereby almost defining a subapical dark spot on each elytron. Centrally the hairs which border the pale bands are quite black, suggesting dark bands bordering pale fasciæ. Usually each elytron has three dark areas, a basal, a median or larger, and a small subapical one; sometimes there is a submarginal darker line in the posterior paler band where it passes into the lateral pale area. Occasionally there is seen a very feeble and narrow cinereous band extending across the pronotal disk at junction of the middle and basal thirds; a few whitish hairs are present on the basal lobe of the pronotum.

Head densely and evenly punctate. Frontal ocellus distinct. Pronotum coarsely and closely punctate, punctures circular, separated by a distance equal to one-half of their diameter, the intervals linear and ridge-like, each puncture bears a hair; sides convergent apically, feebly arcuate basally, more strongly arcuate anteriorly; base lobed at middle, lobe broadly triangular, more prominent posteriorly than the basal angles, the latter blunt and narrowly rounded; disk transversely impressed along the base, impression broadest opposite the lobe and angles.

Elytra less strongly punctured, punctures much smaller and separated by a distance equal to their diameter or one-half of the same. By extension of the pale markings the dark ones become reduced in size and even broken up; sometimes portions of the pale bands are narrowed allowing the dark areas to coalesce, so that quite often a large trapezoidal dark spot is formed across the suture at about the middle of the elytra. Body densely punctate beneath.

Male. Smaller and narrower; last joint of the antennal club apparently twice as long as the two preceding joints combined.

Female. Broader; antennal club abruptly formed, eighth joint but slightly larger than the preceding joints; eleventh about as long as the ninth and tenth taken together.

Measurements of types. Male: length, 3.5 mm.; width, 1.75 mm. Female: length, 4 mm.; width, 2 mm.

Type locality. Summit Station, Eldorado County, California.

Holotype, female, and allotype, male, to be deposited in the entomological collection of the California Academy of Sciences. Paratypes in the collection of the Sugar Planters' Association, Honolulu, Hawaii, and in the Academy's collection.

The above interesting dermestid belongs to the tribe Megatomini. In *giffardi* the basal joint of the hind tarsi is elongate, but little shorter than the next two combined; antennæ eleven-jointed in both sexes. The hypomera are indefinitely concave as usual, there being no antennal fossæ. The antennal club is three-jointed. The mesosternum between the coxæ is moderately narrow, longitudinally grooved and deeply emarginate posteriorly to receive the tip of the metasternal process; the anterior coxæ rather narrowly separated and the epipleuræ strongly defined; metacoxal lamina scarcely at all longer internally.

In *Perimegatoma monticola* Casey the body is black and almost evenly clothed with subdecumbent fulvous pubescence,

with narrow and scarcely noticeable zig-zag bands of more cinereous hairs. Elytral punctures stronger and closer.

In *giffardi* the body is black, unevenly clothed with plumbeous gray pubescence, with distinct transverse bands defining dark areas clothed with nigro-piceous hairs. Elytral punctures small and not deeply impressed. The pronotum throughout the genus is coarsely and very closely punctured. The species are difficult to identify on account of the meager descriptions and lack of mention of variations in color and markings.

A series of ten specimens was collected by Mr. Walter M. Giffard, on the summit of the Sierra Nevada Mountains, Eldorado County, California. I take great pleasure in naming the species after Mr. Giffard.

Trichochrous muiri Blaisdell, new species

Form elongate oblong-suboval and moderately convex. Color deep black; tibiæ and tarsi more or less nigro-piceous, sometimes nigro-rufous. Surface rather polished and shining.

Head rather large, at least three-fourths as wide as the pronotum; frons broadly impressed, impression shallow, sparsely punctate, a feebly glabrous convexity at epistomal base, surface more or less rugulose. Eyes large and moderately prominent. Antennæ stout and gradually incrassate, subserrate anteriorly.

Pubescence blackish for the greater part; shorter hairs of the elytra subdecumbent, brownish or paler in color; black hairs on the disk not erect, but becoming so laterally where they are longer and bristling; those of the head and pronotum longer and more or less irregularly directed. Lateral pronotal marginal cilia rather long, not forming a regular fringe, dark in color. Marginal elytral cilia erect and rather widely spaced, longer at the humeri and decreasing somewhat in length toward apex.

Pronotum transverse, about a third wider than long, apex arcuato-truncate; sides broadly and almost evenly arcuate, converging very moderately to apex, apical angles rounded; base broadly and evenly arcuate, basal angles broadly rounded, sides and base continuous without angulation; disk evenly and moderately convex, punctures moderate in size, sparse, separated by a distance equal to two to four times their diameter, closer toward apical and basal margins, becoming punctato-recticulate in lateral fifth.

Elytra oblong-oval, broadly rounded at apex, rather more than a half longer than wide; punctures rather coarse, separated by a distance equal to two or three times their diameter, smaller toward apex, surface finely rugulose.

Abdomen rather densely punctate; pubescence abundant and moderately long.

Male. Rather narrower and parallel. Antennæ stouter. Fifth ventral abdominal segment modified: apex quite deeply emarginate, bottom of the emargination transverse, adjacent surface of segment rather broadly but not very deeply impressed, floor of the impression, especially near the bottom of the emargination, glabrous and impunctate; beyond the impression the punctures are not denser. Sixth segment distinctly visible, filling in the interval between the lateral apical lobes of the fifth segment.

Female. Broader, sides more evidently arcuate; fifth ventral broadly rounded at apex.

Measurements. (Types) length, 3.5-4 mm.; width, 1.3-1.6 mm.

Type locality. Dublin Cañon, Alameda County, California.

Holotype, male, and allotype, female, to be deposited in the entomological collection of the California Academy of Sciences. Paratypes are also to be found in the collection of the Sugar Planters' Association, Honolulu, Hawaii. Eighteen specimens studied. Collector, Mr. Frederick Muir of Honolulu, Hawaii, to whom the species is dedicated.

Distinct from all other species described, except *sexualis* Casey. In the latter species the modification of the fifth ventral abdominal segment is more strongly marked. In *muiri* it is simpler.

Cœlosattus Blaisdell, new genus

The present opportunity is utilized to make known a remarkable eusattid that appears to be absolutely distinct from any species heretofore reported from America, north of Mexico. After careful review of the species listed in the Biologia, there appears to be but one course to pursue and that is to describe it as new, and to create a new genus for its reception, which is defined as follows:

Form broadly rounded, very convex and Cœlus-like in appearance, with a dense fringe of long fulvous hairs on the propleuræ and epipleuræ; apical and basal margins of the pronotum very densely fimbriate with shorter, even and similarly colored hairs; femora and sterna clothed with very long flying hairs of same color.

Epistoma deeply, broadly and arcuately sinuate, frontal suture distinct. Labrum rather deeply and triangularly sinuate, margin fringed with rather long fulvous hairs. Mentum rather deeply and arcuately sinuate at apex; ligula more deeply and abruptly sinuate, bottom of sinus arcuate. Eyes relatively small, elongate ovate, transverse and slightly oblique. Antennæ more Cœlus-like than Eusattus-like, mod-

erate in length and stoutness, somewhat compact and eleven-jointed; first joint elongate, curved, concealed beneath the sides of the head; club or four joints, feebly defined and moderately compressed, each joint transverse except the eleventh, the latter unevenly arcuate at apex, with sides and apex membranous and clothed with short sensory setæ, dorsal and ventral surfaces chitinous and glabrous.

Prothorax prolonged backward at the sides and enveloping the humeri; base broadly lobed. Prosternal process broad apically as in *Cœlus*. Epipleuræ difficult of observation on account of the abundant pubescence, but apparently as in *Sphæriontis;* near apical third the elytral margin becomes gradually and narrowly explanate to apex; sides of elytra inflexed as in *Sphæriontis* and *Cœlus*. Scutellum not visible.

Anterior tibiæ dilated as in certain species of *Hister*; lateral edge arcuate basally, sinuate apically before the moderately produced apical angle. Femora rather slender. Anterior tarsi slender, relatively small; first joint elongate, thickened apically, slender basally and nearly as long as the remaining four joints.

Middle tibiæ slender, rounded in section, slightly dilated at apex, rather strongly arcuate; tarsi slender and elongate, first joint elongate, as long as the third, fourth and fifth taken together, form same as that of the anterior tarsi. Hind tibiæ wider, more compressed, feebly arcuate; hind tarsi slightly less elongate than the middle, basal joint and relative length of joints as in middle tarsi.

Middle coxæ rather widely separated by the mesosternal intercoxal process, which is slightly impressed on the surface and arcuately sinuate at apex. Metasternum short. Abdominal intercoxal process triangular. First and second ventral abdominal sutures straight. Tibial spurs long, the inner about as long as the first tarsal joint.

Cœlosattus fortineri Blaisdell, new species

Color deep black, shining, about a third longer than wide. Head not wider than the pronotal apex, sides a little expanded, abruptly and strongly arcuate in front of the eyes, thence obliquely convergent to the oblique sutures where there is a small sinuation; epistomal lobes slightly arcuate with margin a little reflexed; surface rather narrowly impressed within the margin from the eyes to the median sinuation; frontal suture moderately impressed, epistomal surface less than moderately convex; front broadly and slightly convex, muricately and subtuberculately punctate, densely so about the eyes and on the vertex, less so centrally, where the interstitial surface is finely punctulate; surface almost impunctate about the epistomal sinus. Labrum punctate. Eyes but slightly visible from above, more or less concealed by the apical pronotal fimbria, twice as long as wide, narrowly rounded below, more broadly so above, facets not coarse. Antennæ with joints four to seven slightly wider than long, eight to ten about a third wider than long, third a little longer than wide.

Pronotum transverse, twice as wide as long, apex feebly sinuate in almost circular arc; base broadly and arcuately lobed in middle five-eighths, thence rather strongly sinuate to the posteriorly prominent basal angles, the latter obtuse at tip; sides less than moderately arcuate and not strongly convergent to the obtusely rounded apical angles; disk very feebly convex antero-posteriorly, evenly and moderately strongly convex from side to side to the narrowly impressed and somewhat explanate margins, the latter not strongly beaded; central area against the apical margin and nearly to the base, glabrous and impunctate, laterally and narrowly along the base more or less densely muricato-subtuberculately punctate, laterally the punctures bear fulvous hairs. Propleuræ punctate anteriorly in front of the coxæ, longitudinally rugose and glabrous posteriorly. Prosternum densely and muricately sculptured.

Elytra about as wide as long; humeri enveloped by the basal pronotal angles; disk strongly convex and very arcuately declivous posteriorly; sides quite broadly rounded, the inflexed portion more or less flattened; surface densely and muricately punctate on the disk, the tubercles much flattened, becoming subtuberculate laterally and on the apical declivity. Epipleuræ punctate and clothed with long fulvous hairs. Elytral margin at apex narrowly explanate.

Abdominal segments for the most part glabrous and impunctate, except first segment which is punctate laterally and on and about the intercoxal process; a few scattered punctures are seen at middle of the segments at apex, the fifth segment sparsely punctate. Metasternum glabrous about the abdominal process. Legs of moderate length and relatively slender.

Measurements. (Type) length, 12 mm.; width, 7.2 mm.

Type locality. Grey's Well, near Yuma, Imperial County, California. Collected by Mr. John C. Fortiner of Brawley, Imperial County, on November 25, 1926. I take pleasure in naming the species after the discoverer, who states that the "beetles were found in sand, four to six inches below the surface; no vegetation in the locality to speak of."

Type to be placed in the collection of the California Academy of Sciences. Paratypes in the author's collection and that of Mr. George Field, San Diego, California.

The above remarkable species at first glance closely resembles *Cœlus grossus* Casey. It is generically distinct by the dilated and fossorial anterior tibiæ, slender legs and arcuate middle tibiæ, more widely separated middle coxæ and rather broad mesosternal intercoxal process. The long and abundant fulvous cilia and pubescence are striking characteristics.

THE LARVA OF A SPECIES OF THE CASSIDIDÆ (COLEOPTERA)

BY G. F. FERRIS AND E. W. NISSEN
Stanford University, California

Among the material collected by the senior author in the course of a recent collecting expedition in Mexico there were included larvæ belonging to some species of the Chrysomeloid family Cassididæ. Although no adults of this were obtained and consequently the identification of the species is not possible, the specimens are of sufficient interest to justify some study of them. An examination of the available literature dealing with the immature stages of this group shows that very few, if indeed any, of the larval stages have been described with reference to their more minute details although there exist most excellent descriptions of their general features in the work of Muir and Sharp and of Schultze. It appears, moreover, as far as may be determined from the literature, that the particular species represented in this collection has certain peculiarities not common to all the species of the family.

It is therefore as an extension of the knowledge of the form and structure of the larval stages of this family that the following notes are presented. The junior author is responsible for the figures and the senior author for the initiation of the paper and its actual writing.

Material examined. Two apparently fully grown larvæ, found feeding on *Cordia* sp. at Manzanillo, Mexico, November 5, 1925. A species of this family, *Eurypepla jamaicensis* (L.), has been recorded as feeding upon plants of this genus in the West Indies and Florida and it is possible that the specimens at hand represent the same or congeneric form.

Habit. Occurring upon the surface of the leaves. In life of a pale green color except for the dorsum which is dark brown or black. The excremental mass, which is carried attached to the caudal process, forms a compact lump composed of the intertwining coils of fœces and entirely enclosing the exuviæ. Apparently this mass is subject to loss of material for a careful examination of these two specimens revealed only a portion of the series of cast skins, one specimen showing only the skin of the fourth stage and the head of the third, the

other showing the skin of the fourth and the heads of the second and third stages.

The assumption that is here made concerning the numbers of the stages is based upon published observations in the case of other species and upon deductions drawn from the comparative sizes of the head capsules.

Fifth larval stage (Fig. 1, A). Length on slide 1-1.3 cm. Lateral appendages fleshy, rather than spiny as described for other species, and pale-colored except for the extreme tips of the main trunks which are black, destitute of all but a very few minute setæ. These appendages are arranged as follows: prothorax with four on each side, mesothorax and metathorax with two, each abdominal segment up to and including the eighth with one.

Body terminating in a relatively huge, club-shaped caudal process which probably represents the produced notum of the ninth segment and may involve the notum of the eighth as well. At the tip of this caudal process is a pair of short processes that possibly represent the appendages of the ninth segment.

Spiracles quite conspicuous, confined to the mesothorax and to the first seven abdominal segments and placed on the dorsum at the base of the lateral appendages; with no peculiarities of structure.

Dorsum of the abdomen from about the center of the pronotum to the posterior margin of the seventh abdominal segment and within the line of the spiracles chitinized in a peculiar fashion, the pigmentation being laid down in the form of a mosaic of minute plates which are closely spaced (Fig. 1, G). The caudal process is heavily and uniformly chitinized throughout. Ventral side of the body entirely membranous except for a series of small chitinized patches on the fourth to eighth abdominal segments. These likewise are composed of a mosaic of small plates, but the plates terminate in a small, free spine (Fig. 1, H).

The antennæ (Fig. 1, C) are two-segmented. The eyes are represented by four ocellanæ (using MacGillivray's term) on each side behind the antennæ (Fig. 1, B). Of the mouthparts the labrum is as shown in Fig. 1, I; the mandibles (Fig. 1, J) are stout and four-toothed, the teeth with their margins mi-

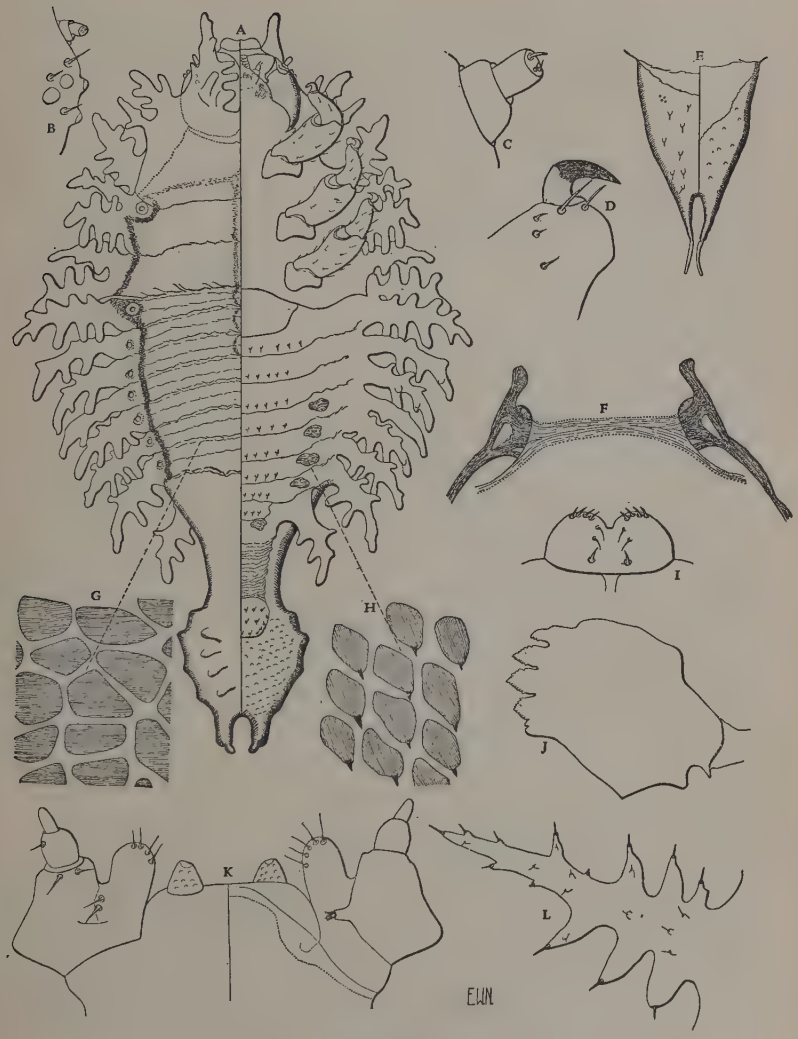


FIGURE 1

Larva of undetermined Cassidid beetle. A, fifth stage; B, ocellanæ from ventral aspect; C, antenna; D, claw and apex of tibia; E, caudal process of fourth stage; F, tentorium of fifth stage; G, portion of derm of dorsum showing mosaic pattern; H, portion of derm of venter; I, labrum; J, mandible; K, labium and maxillæ, left half ventral (outer) aspect, right half dorsal (inner) aspect; L, lateral appendage of fourth stage.

nutely serrate; the maxillæ and the labium are closely united (Fig. 1, K), the former with a single lobe and with two-segmented palpi, the latter consisting of a single broad lobe which bears very short, one-segmented palpi. The tentorium (Fig. 1, F) is a transverse bar which unites at each side with the chitinous margin of the head capsule bordering the membranous gular region.

The legs are short and stout, without trochanter and without a tarsus, the claw apparently arising from the tip of the tibia (Fig. 1, D).

Ventral side of the abdomen membranous, with a single row of small setæ, which are borne on small tubercles, in the mesal region of each segment. Rectum capable of eversion, the anal region with numerous small setæ on small tubercles.

Fourth stage. In the characters of the head and legs entirely resembling the fifth stage but differing in having the lateral processes black, heavily chitinized and spine-like rather than fleshy (Fig. 1, L). The tip of each minor process bears a single stout seta. Anal process (Fig 1, E) shorter and more slender than in the fifth stage and terminating in a fork, the apical portions of which are membranous.

Second and third stages. Of these only heads are available, these differing from the other stages only in size.

Rules of Zoological Nomenclature

The Biological Society of Washington has placed all interested in entomological nomenclature under lasting obligations by the republication of the International Rules of Zoological Nomenclature, with a summary of Opinions 1 to 90, in Vol. XXXIX of their Proceedings (pp. 75-104). We understand that extras of this reprint can be obtained at a nominal cost. Virtually all our working entomologists follow these Rules, or try to do so. The sentiment regarding the "Opinions" perhaps is not quite as unanimous. A few of these are not accepted by certain of our most capable students and probably never will be. Such are Nos. 46 and 79, in the first of which the wording is obscure, the second is too "Rigidly construed" to be logical. With a few exceptions these "Opinions" are most welcome as a help in stabilizing nomenclature.—E. P. Van Duzee.

ON THE SYNONYMY OF SOME THYSANOPTERA OCCURRING IN CALIFORNIA*

BY J. DOUGLAS HOOD
University of Rochester

In this paper I have consolidated fourteen supposed species into three. Two species described by one worker have been united with three described by another. This suggests the existence of a large number of synonymous names in other parts of the order, a suspicion which we find supported by the facts; and in other papers, to be published from time to time, some of this synonymy will be pointed out.

Aside from the more careful study of material, which is obviously necessary on the part of certain students, two means for the improvement of descriptive work on the group present themselves: First, the devotion of more time and thought to the technique of slide making, so that *every* specimen can be studied satisfactorily; and second, the employment of larger series of paratypes, so that other specialists may be provided with actual specimens, rather than with descriptions which can never be adequate for the simple reason that new characters and new differences, not mentioned in the original diagnoses, are continually being discovered.

ANAPHOTHRIPS SECTICORNIS (Trybom)

1896, *Thrips secticornis* Trybom, Öfvers. K. Vetensk. Akad. Förh., No. 8, p. 620. [Portland and Albany, Oregon; Ribachi, Pen., Russia (Lapland).]

1899, *Anaphothrips secticornis,* Reuter, Acta Soc. Fauna Flora Fenn., Vol. XVII, No. 2, pp. 43, 44.

1904, *Sericothrips apteris* Daniel Ent. News, Vol. XV, p. 295. [Berkeley, Cal.]

1908, *Apterothrips subreticulata* Bagnall, Trans. Nat. Hist. Soc. Northumb., etc., N. S., Vol. III, Pt. I, p. 185, Pl. VI, figs. 1-3. [Queen Charlotte Islands, B. C., Canada.]

1926, *Anaphothrips apteris,* Moulton, Pan-Pac. Ent., Vol. III, p. 23.

Doctor Trybom described this species in 1896 from specimens taken by himself in Oregon and in Russia, and three years later Reuter referred it to *Anaphothrips.* Since then its affinities have been largely misunderstood. Miss Daniel considered

*Contribution from the Entomological Laboratories of Cornell University.

it a *Sericothrips* (which has a densely pubescent abdomen) and Bagnall erected for it a distinct genus (which he compared with *"Euthrips"* and *Pachythrips*). Moulton referred *Sericothrips apteris* Daniel to *Anaphothrips* quite properly, but failed to note its identity with *Anaphothrips secticornis.*

The material that I have had for study is thoroughly authentic, and is listed below:

California: "San Francisco, 1902 ?, S. M. Daniel," 2 ♀'s (paratypes of *Sericothrips apteris* Daniel), ex coll. Daniel.

Berkeley, March 1, 1906, grass, Dudley Moulton; 1 ♀, ex coll. Moulton and U. S. Bur. Ent.*

"Santa Cruz, lettuce," D. L. Crawford; 2 ♀'s, ex. coll. Crawford.

Colorado: Grant, July 21, 1916, sweeping, L. O. Jackson; 2 ♀'s [Hood No. 345].

Canada: Queen Charlotte Islands, B. C., September 4, 1891, on nettle; 1 ♀ ("cotype" of *Apterothrips subreticulata* Bagnall), ex coll. British Museum, Natural History.

Lillooet, B. C. (Mount McLean, 7000 feet), on *Lupinus arcticus,* R. C. Treherne; 3 ♀.

Austria: Warscheneck (Alps), 1600 m., July 17, 1919, swept; 5 ♀, ex coll. H. Priesner.

Haplothrips fasciculatus (Crawford)

1909, *Phyllothrips fasciculata* Crawford, Pomona Coll. Journ. Ent., Vol. I, No. 4, p. 105; fig. 48, A-H. [Claremont, Cal., on *Eriogonum fasciculatum.*]

1909, *Phyllothrips fasciculata* var. *stenoceps* Idem, ibidem, p. 108 [With the typical form.]

1912, *Anthothrips nigricornis* Jones (nec. Bagnall, 1910), Tech. Ser. 23, Pt. I, Bur. Ent., U. S. Dept. Agr., p. 17, Pl. V, figs. 1-4. [San Jose, Cal., on *Eriogonum nudum.*]

1912, *Haplothrips jonesii* Karny, Zool. Ann., Vol. IV, p. 344.

1913, *Leptothrips russelli* Morgan, Proc. U. S. Nat. Mus., Vol. 46, p. 39, figs. 72-75. [Laurel Cañon, Cal.]

Crawford's *Phyllothrips fasciculatus,* described from Claremont, California, and Jones' *Anthothrips nigricornis* (later renamed *jonesii* by Karny because the name had been preempted), described from San Jose, California, were both taken on species of *Eriogonum,* or wild buckwheat. It is not surprising, then, that they are the same. Of *Leptothrips russelli,* from Laurel Cañon, California, Morgan says in his original description that the food plant is unknown. I have seen type

*This specimen is marked "♀ cotype" and in another place "type," but is most certainly neither, having been taken sixteen months after the species was described.

material of all three species and they are identical, although a study of the several descriptions and figures would lead one to think otherwise. The characteristic form of the third antennal segment is best seen in the illustrations of Crawford and Morgan.

The posteriorly narrowed head of the variety *stenoceps* Crawford is really more nearly normal than that of the other specimen figured by him. I have elsewhere remarked that this variety is untenable, "having been erected for the reception of specimens of the typical form which had *not* become crushed in the mounting."

This species, with those which I have described as *malifloris, purpuratus,* and *distalis,* suggest the derivation of the genus *Leptothrips* from *Haplothrips*-like, instead of *Liothrips*-like, ancestors. Though closely related, *Leptothrips* and *Haplothrips* need not be merged. The absence of a midlateral bristle in the former will serve to distinguish them, at least until possible intermediate forms are discovered. Most interesting is the elongation of the head in these four related *Haplothrips;* the production of the conical vertex forward until it overhangs the insertion of the antennæ; and the deeply and closely longitudinally striate metanotum, all of them characters highly suggestive of *Leptothrips.*

The following material has been studied:

California: Claremont, on wild buckwheat (*Eriogonum fasciculatum*), D. L. Crawford; 4 ♀, 1 ♂ ("cotypes" of *Phyllothrips fasciculata* Crawford).

San Jose, July-September, 1910, on flowers of *Eriogonum nudum,* P. R. Jones; 3 ♀, 2 ♂ (*holotype, allotype,* and *paratypes* of *Anthothrips nigricornis* Jones).

Laurel Cañon, May 14, 1911, H. M. Russell; 1 ♀ (*paratype* of *Leptothrips russelli* Morgan).

Genus KARNYOTHRIPS Watson

(*Zygothrips* and *Haplothrips* auctores, partim)

1922, *Karynia* (sic !) Watson lapsus typog. for *Karnyia,* preëmpted), Fla. Ent., Vol. VI, p. 6. [Type: *K. weigeli,* n. sp. (= *Anthothrips flavipes* Jones), by designation.]

1923, *Karnyothrips* Watson, Bull. 168, Fla. Agr. Exp. Sta., p. 70. [New name for *Karynia* Watson].

Karnyia was misspelled, preoccupied, and assigned to the wrong subfamily, and its type species is a synonym; but, by

purely fortuitous circumstances, it appears to find a place in our classification when these technical difficulties have been overcome by changing the name to *Karnyothrips*. The genus may be known in both sexes by the enlarged tooth, claw-like and somewhat forwardly directed, which arises from the inner distal angle of the first tarsal segment (Fig. 1, b); by the close union of the last two antennal segments (this union being closer even than in *Zygothrips*); and by the long hairs at the tip of the tube, which are frequently twice the length of that body segment. Its affinities are, of course, with *Zygothrips, Haplothrips,* and *Hindsiana,* rather than with *Cryptothrips.*

To *Karnyothrips* should be assigned the following species, and perhaps others which I have not seen:

K. melaleuca (Bagnall), described in *Hindsiana*;
K. dodgei (Hood), described in *Hindsiana*;
K. rhopalocerus (Hood), described in *Hindsiana*; and
K. flavipes (Jones), described in *Anthothrips.*

Karnyothrips flavipes (Jones)

(Fig. 1, b)

——, *Phlœothrips lucasseni* Krüger (?). (See van Deventer, Handboek Suik.-Cult. Rietsuik.-Fabr. Java, Deel II, p. 282, Pl. 38, fig. 4; 1906). [Java.]

1912, *Anthothrips flavipes* Jones, Tech. Ser. 23, Pt. I, Bur. Ent., U. S. Dept. Agr., p. 18, Pl. V, figs. 5-7. [San Jose, Cal.]

1912, *Cryptothrips salicis* Jones, ibid., p. 20, Pl. VI, figs. 1-3. [San Jose, Cal.]

1913, *Haplothrips ceylonicus* Schmutz, Sitzungsb. k. Akad. Wiss. Wien, Mathem.-naturw. Kl., Bd. CXXII, Abt. I, pp. 1033, 1038. [Ceylon.]

1915, *Zygothrips pullus* Hood and Williams, Journ. N. Y. Ent. Soc., Vol. XXIII, p. 127, Pl. VIII, fig. 1. [New Orleans, La.]

1921, "A Blood-Sucking Thrips," Williams, The Ent., Vol. LIV, p. 163.

1922, *Karynia* (sic !) *weigeli* Watson, Fla. Ent., Vol. VI, p. 7. [New Orleans, La.]

1923, *Haplothrips harnedi* Watson, Fla. Ent., Vol. VI, p. 45. [Southern Mississippi.]

1923, *Haplothrips oneco* Watson,* Bull. 168, Fla. Agr. Exp. Sta., pp. 58, 60. [Oneco, Fla.]

1927, *Karnyothrips flavipes,* Hood, The Ent., Vol. —, p. —.

*This species appears never to have been formally described. Mr. Watson l. c. uses the specific name in his key to Haplothrips, and the descriptive matter there given is sufficient to validate it. It is not described in any of his papers listed in his bibliography on pages 87 and 88.

Under *Karnyothrips flavipes* I have assembled a number of species described in various genera from widely separated parts of the world. Such a formidable citation of synonyms may appear to require explanation; but nothing more need be said, I think, than that I have seen type material of four of the species and well-authenticated specimens of three others. *Phlœothrips lucasseni* Krüger is thus the only one known to me merely by its description, and I have questioned its identity with *flavipes*. Van Deventer figures and describes a much paler antennal coloration for *lucasseni* and shows a long, slender tube in his figure; but in spite of this I cannot help believing them the same. The inversion of the ocellar triangle in his illustration is merely an error in drawing.

This is the species for which Williams has described a blood-sucking habit, based upon observations made in Trinidad, British West Indies, by himself and Mr. F. W. Urich (see Williams, l. c., and Hood, l. c.).

The material studied is listed below:

California: San Jose, February 9, 1910, from emergence cage for Pear Thrips, P. R. Jones; 1 ♀ (*holotype* of *Anthothrips flavipes* Jones).

San Jose, September 15, 1909, reared from willow galls, P. R. Jones; 1 ♀ (*holotype* of *Cryptothrips salicis* Jones).

Mississippi: "Southern Mississippi," November, 1914, on citrus, R. W. Harned; 2 ♀ (*paratypes* of *Haplothrips harnedi* Watson).

Louisiana: New Orleans, December 1, 1914, on bamboo, C. B. Williams; 11 ♀ (*holotype* and *paratypes* of *Zygothrips pullus* Hood and Williams).

New Orleans, September, 1922, predaceous on *Pseudaonidia duplex*, H. L. Dozier; 2 ♀ (det. by Watson as *Karnyia weigeli* Watson).

Florida: Gainesville, February, 1924, on long-leaf pine, T. H. Hubbell; 1 ♀ (det. by Watson as *Haplothrips oneco* Watson).

West Indies: Barbados, March 23, 1915, swept from grass by seashore, C. B. Williams; 3 ♀ [C. B. W., No. 596].

Trinidad (St. Joseph), March 29, 1915, on camphor and bamboo, C. B. Williams; 4 ♀ [C. B. W., Nos. 619 and 616, respectively].

Trinidad (Port-of-Spain), May 12, 1918, sucking blood from wrist; 1 ♀ [C. B. W., No. 1059].

St. Vincent, December 11 and 12, 1917, from bamboo, etc., C. B. Williams; 2 ♀ [C. B. W., Nos. 1021 and 1025].

Sumatra: "Klaten bei Djokja," October 5, 1923, leaves and flowers of tobacco, L. Fulmek; 1 ♀ (det. by Karny as *Haplothrips ceylonicus* Schmutz).

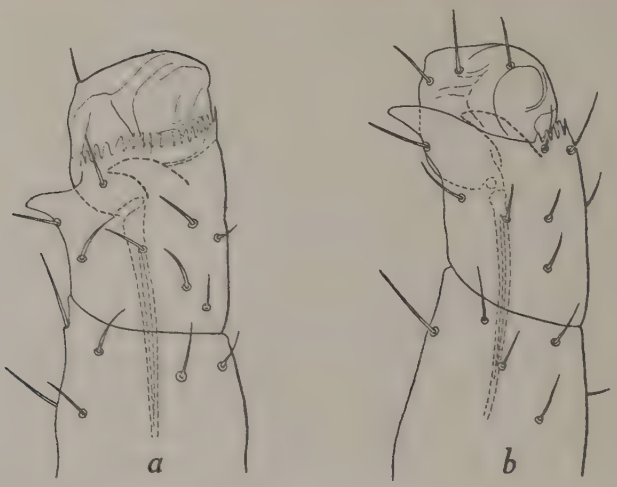


FIGURE 1

a. Right fore tarsus of *Haplothrips*, showing the tooth arising from the ***inner surface*** of the first tarsal segment.

b. Right fore tarsus of *Karnyothrips*, showing the claw-like, somewhat forwardly directed tooth arising from the ***inner distal angle*** of the first tarsal segment.

NOTES ON ORTHOPTERA AND DERMAPTERA FROM UTAH

BY VASCO M. TANNER

Brigham Young University, Provo, Utah

It has always been my hobby while collecting Coleoptera throughout the state of Utah to take as large a series of Orthoptera as possible. As a result I now have a collection of over 800 specimens, some rare species and some that extend the known range of the species. The Great Basin is practically unknown entomologically, only a few serious attempts having been made to study the insects of this region. Dr. W. W. Henderson in his valuable paper (Oedipodinæ Found in Utah; Ut. Agri. Exp. Sta. Bull. 191, 1924), points out that no Blattidæ, Mantidæ, Phasmidæ, and Dermaptera have been recorded for Utah. I find, however, that three species from two of the above families have been reported for Utah. Mr. Morgan Hebard (Blattidæ of N. Am. N. of Mex. Boundy., Acad. of Nat.

Sci., Phil., 1917), lists *Arenivago erratica* Rehn from St. George, Utah. Prof. E. O. Essig in his epoch-making treatise, Insects of Western North America, September, 1926, also lists *Arenivago erratica* Rehn and two mantids, *Litaneutria obscura* Scudder and *Stagmomantis carolina* (L.) from this state.

The following species, most of them determined by Mr. James A. G. Rehn, seem to be new records for this state:

Blattidæ.

Blatta orientalis L. Taken at St. George and Salt Lake City, Utah.

Blattella germanica (L.) Taken at Eureka and Provo, Utah.

Corydidæ.

Arenivaga erratica (Rehn). Taken at St. George and Leeds, Utah, under rocks on the dry hills. Listed by Hebard and Essig.

Mantidæ.

Stagmomantis californicus R. and H. Common in the springtime on trees and shrubs about St. George, Utah.

Phasmidæ.

Parabacillus coloradus (Scudder). Rare. I have taken it at St. George, Zion National Park, Kanab, and Mr. Serville Flowers sent me (1926) two females from Price, Utah.

Gryllidæ.

Gryllus assimilis De Geer. Common in the Virgin River Valley of Utah.

Miogryllus lineatus (Sc.). St. George, Utah.

Œcanthus nigricornis F. Walker. Taken with the net on vegetation in Zion National Park.

Dermaptera.

Spongovostox apicedentatus (Caudell). I have taken this interesting insect under the dead bark of *Populus fremonti* in May and December at St. George, Utah.

COMSTOCK'S BUTTERFLIES OF CALIFORNIA

This sumptuous book comes to hand too late for a review notice in this number but we embrace this opportunity to call attention to it. It contains 334 pages of letter press and 63 colored plates, "embracing all of the 477 species and varieties at present recorded from this state." There are colored figures of all of the species and of their varieties and aberrations. Probably there is very little known of our California butterflies that is not recorded in this volume. It can be obtained from its author, Dr. John Adams Comstock, 501 Edwards-Wildey Building, Los Angeles.

DESCRIPTION OF A NEW SPECIES OF MYMARIDÆ PARASITIC IN PSOCID EGGS (HYMN.)

BY A. B. GAHAN

United States Department of Agriculture
Bureau of Entomology

Mr. F. J. Spruyt, who collected the material from which this new species of *Alaptus* is described, desires to publish some notes on its biology, and the description is published at this time in order to make the name available for his use.

Alaptus psocidivorus Gahan, new species

This species runs to *minimus* Walker in the key to species of the genus *Alaptus* published by Girault (Ann. Ent. Soc. Amer., Vol. I, 1908, p. 193). It has a much shorter ovipositor than *minimus,* as that species is represented in the national collection by the specimens studied by Girault. In *minimus,* viewed from the ventral side, the ovipositor slit extends the whole length of the abdomen from base to apex, while in the new species this slit begins at about the third segment and extends to the apex of the abdomen. In *minimus* the fore wing has a distinct longitudinal row of discal cilia paralleling the anterior margin at a considerable distance from the margin, in the apex of the wing becoming more or less double. In the present species the disc of the wing is bare except for a single longitudinal row of cilia so close to the anterior margin that it is more or less confused with the ever-present row of short cilia occurring between the bases of the long marginal cilia. In *cæcilii* Girault the ovipositor is about as in the new species, but the fore wing has from two to six cilia on the disc arranged in a longitudinal row down the middle. Girault's species is also paler in color than *psocidivorus.*

Female. Length, 0.48 mm. Head as broad as thorax; antennæ almost exactly as figured for *minimus* by Girault (l. c., p. 183); scape strongly curved; pedicel much thicker than the funicle and a little less than twice as long as broad; funicle joints 1-3 cylindrical, the second barely longer than either the first or third and about four times as long as broad, joints 4 and 5 thicker and subovate, the fifth approximately twice as long as broad and subequal in length to the first; club elongate ovate, thicker than the last funicle joint and equal in length to the three preceding joints; thorax mostly smooth; the mesoscutum weakly reticulated; scutellum transverse, pillow-shaped,

with a strong transverse groove or fold across the middle, the area behind the fold with its lateral angles striated longitudinally; fore wings normal for the genus, the longest marginal cilia about three times as long as the broadest part of the wing-blade; hind wings with a single row of discal cilia near the margin; abdomen broadly oval, about as long as head and thorax combined, the tergites subequal, the first apparently incised medially; ovipositor barely extending beyond apex of abdomen. Color (in balsam) brownish testaceous, the head usually a little darker than the thorax; legs pale testaceous; fore wing hyaline with the base proximad of the notch faintly streaked with fuscous; hind wing mottled with fuscous throughout its length.

Male. Length, 0.47 mm. Similar to the female except that the abdomen is subquadrate, no broader than the thorax, and the antennæ are ten-jointed, the flagellar joints all subequal in length and subcylindrical, each about three times as long as broad. Color very slightly darker than in the female.

Type locality. **Stanford University, California.**

Type. Cat. No. 28,676, U. S. N. M.

Described from many specimens of both sexes, mounted in balsam, and received from F. J. Spruyt with the statement that they were reared in April, 1923, from the eggs of a psocid occurring on *Heteromeles*. Type, allotype and thirty-six paratypes in the United States National Museum. Other paratypes returned to the collector for deposit in the collection of the California Academy of Sciences and in his own collection.

Some Recent Papers

Our American Dipterists will be interested in a paper by Dr. O. Kröber, published in the Stettiner Entomologische Zeitung (Vol. LXXXVII, pages 209-353), entitled "Die Chrysopsarten Nordamerikas einschl. Mexicos," and in a paper by Dr. F. R. Cole (Proc. Calif. Academy of Sciences, Ser. 4, Vol. XIV, No. 14) on the terminal abdominal structures of male Diptera. The former is a revision of our North American species of Chrysops, the latter a work of 103 pages and 21 plates reviewing and illustrating the male genital characters of each of the dipterous families. Number 3 of Volume VII of the recently revived Entomologica Americana, contains a classification of the nut curculios (formerly Blaninus) of Boreal America which will interest our Coleopterists.

NOTES ON ALAPTUS PSOCIDIVORUS GAHAN A NEW SPECIES OF MYMARIDÆ (HYMENOPTERA)

BY F. J. SPRUYT
Santa Cruz, California

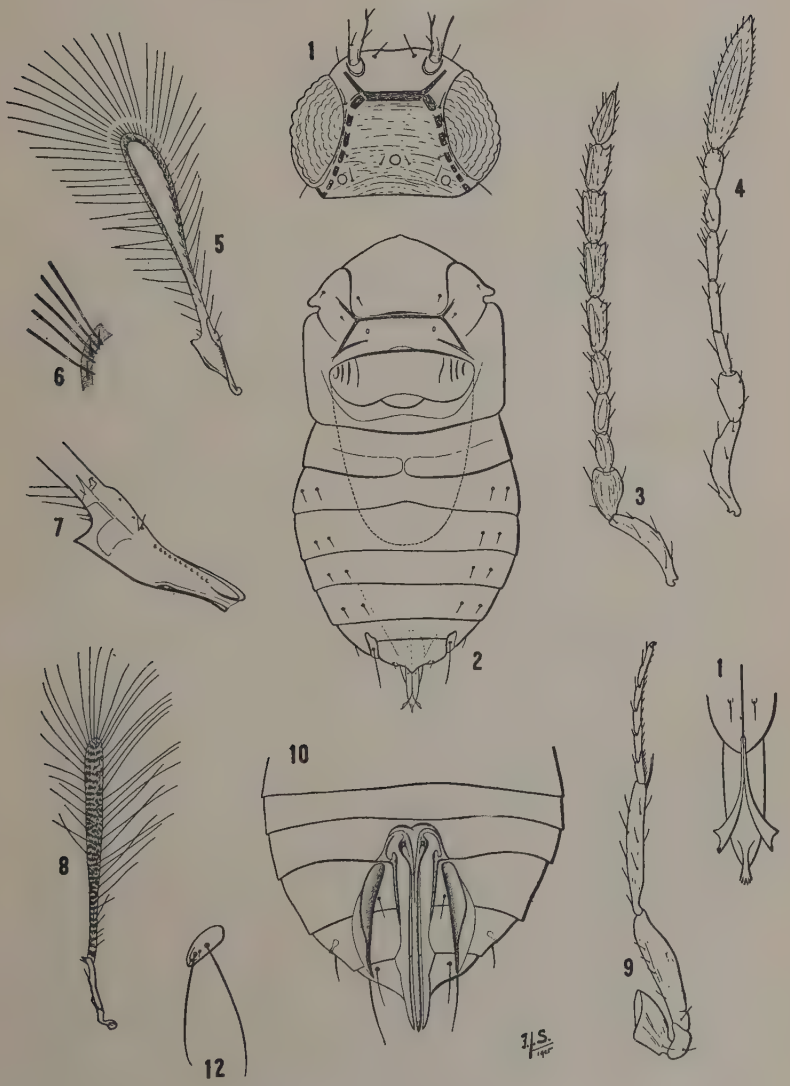
The first time adults of this genus came to my attention was on February 20, 1923. Egg clusters of the host, *Peripsocus californicus,* Banks, were kept under observation at the time.

Although sufficient adults of *Alaptus psocidivorus* could be procured for observation in the laboratory, difficulty was experienced in keeping them alive for any length of time and in handling these fragile little wasps. Over night a whole brood would die off, due either to excessive heat in the laboratory or to lack of moisture. Individuals could be found lapping up the moisture from the walls of the phials in which they were kept.

The adults are a little less than 0.5 mm. in length and are pale brown in color. When alive the minute creatures are barely detectable with the unaided eye, and when on the wing they can easily be mistaken for dust particles soaring in the light.

The normal development of the Psocid eggs was found to be from eight to twelve days. Two days before issuing a very distinct egg tooth became apparent. (Wachter, Pan.-Pac. Ent., Vol. II, No. 2, 1925.) The development of parasitized eggs, on the contrary, took twenty-six days for completion, while eighteen days after being parasitized two large characteristic red eye spots would appear. In some cases the parasitized eggs in the later stage of development took on a dark steel-blue color. This very likely can be ascribed to the fact that the Alaptus pupa case became visible through the egg chorion, which, in this particular instance, was almost transparent. In other cases where the chorion of the normal Psocid eggs was somewhat milky in color it remained unchanged after being parasitized or even became more dense and opaque.

The first sign observed of the issuing Alaptus was the appearance of a wet spot. The softened egg shell was pushed from within, and thus a hole was produced. The insect seemed to dissolve the egg shell rather than to chew its way out, although it possesses a strong pair of mandibles. After the parasite left



1, head of *Alaptus psocidivorus*; 2, male thorax and abdomen showing propodeum and phragma; 3, male antenna; 4, female antenna; 5, left fore wing (drawn to smaller scale); 6, enlarged section of posterior margin of fore wing showing marginal cilia and single row of discal cilia; 7, wing base of No. 5 enlarged; 8, right hind wing; 9, hind leg; 10, ovipositor in situ (ventral view); 11, male genitalia; 12, abdominal plate.

the egg, a uniform round hole was found in one end, while the egg shell remained milky or dark steel color. Normally hatched Psocus eggs, on the other hand, are split open with the assistance of an egg burster, and the empty shells are either milky or transparent.

Different broods of both sexes were confined, but no mating was observed. Great difficulty was experienced by the female in reaching the egg, due to the thickness of the protecting covering of the Psocus egg cluster. The eggs were constantly missed and she did not seem to be able to locate them properly. In an effort to reach the egg with the ovipositor the normal shape of the abdomen became distorted into a square. For a long time her efforts remained without success and actual oviposition was not observed until late in the evening, when a less densely covered egg mass was located and the position of the subject was such that the proceedings could be followed accurately. The ovipositor was not inserted at any particular portion of the egg. After having tried different places a hole was drilled, and with an up and down pumping motion the egg was set off. The time average for oviposition was found to be one minute and twenty-five seconds, while the intermissions varied from thirty to forty-five seconds. After an egg was deposited the ovipositor was slowly pulled back and in some cases much time was consumed in locating the next egg to be attacked. The female walked around as if searching, piercing already parasitized eggs. She seemed to be making sure of having done a thorough piece of work, or perhaps to be in search of food from the egg contents, although its source was in each case out of reach.

Since the identity of the Psocids was not accurately checked, it is probable that more than one species of Psocidæ serves as hosts to *Alaptus psocidivorus*. In addition, among the collected material three specimens of *Alaptus cæcilii,* Girault, were found, thus indicating that *psocidivorus* is not necessarily the specific egg parasite of *Peripsocus californicus.*

NOTES ON A FEW AMPHOROPHORA (APHIDIDÆ) OF UTAH

BY GEORGE F. KNOWLTON
Utah Agricultural Experiment Station
Logan, Utah

The suggestion of Mason * that this group may not be a phyleogenetic unit, is undoubtedly correct. Until a more natural grouping is found it will be convenient to place certain forms here.

The writer wishes to thank Mr. P. W. Mason for his opinion regarding Utah material in this group.

Amphorophora nigricornis Knowlton, n. sp.

Taken September 3, 1925, at Fielding, Utah, on *Polygonum persicaria*. This black aphid resembles *Amphorophora nabali* Oestlund in many respects, but differs in having fewer sensoria on antennal IV, and none on V, lacking pronounced constriction to long narrow cauda, and having a darker-colored body.

Alate vivipara. Head and thorax black; length 2.5 mm.; rostrum dark at distal end, reaching second coxa; antennal tubercles fairly prominent; antenna black and sensilla usually finger-like; antennal III, 0.75 mm. long, tuberculate, due to the very numerous sensoria; IV, 0.42 mm.; with four to eight sensoria; V, 0.37mm., lacking secondary sensoria; VI, 1.07 (0.1 + 0.97) mm.; legs rather long, mostly black; wing venation typical, veins dark; abdomen blackish, without lateral tubercles; cornicles black, 0.55 mm. long, distal half swollen to twice the diameter of narrowest part, and enlarged again toward body; cauda long, black, very slightly constricted near base, with a row of four hairs on each side.

Taken in Smithfield Cañon, Utah, on August 24, 1925. On underside of leaf of birch (*Betula fontinalis*) at an elevation of 6000 feet. Named for Mr. D. G. Hall, Jr., who accompanied the writer during the summer of 1925 in a survey of much of Utah, southern Idaho, and northern Arizona.

Amphorophora halli Knowlton, n. sp.

Alate vivipara. Yellowish-green body, 2.35 mm. long; rostrum scarcely reaching second coxa; antennal tubercles prominent; antenna and head armed with globate to finger-like sensilla; antennal VI, most of III and distal part of IV and V, black; III, 0.74 mm. long,

*Mason, P. W. (1925). A Revision of the Insects of the Aphid Genus Amphorophora, Proc. U. S. Natl. Mus., Vol. 67, Art. 20, p. 4.

with nineteen to twenty secondary sensoria in a row; IV, 0.54 mm., lacking sensoria; V, 0.53 mm.; VI, 1.2 (0.18 + 1.02) mm.; first antennal slightly gibbus on inner surface; legs moderately long; wings long, venation normal with basal veins darker than Rs. or media, and with slight shading at ends of veins; cornicles 0.78 mm. long, swollen on inner distal half, black at distal end with moderate flange; cauda long, conical, very slightly narrowed near base, with two hairs on each side and one dorsal.

Amphorophora nervata (Gillette)

This rather small aphid is frequently encountered in Utah on cultivated and wild roses. Collections have been made from Benjamin, Brighton, Logan Cañon, Payson, Salt Lake City, Smithfield Cañon, and Spanish Fork. During the summer of 1925 it was present in damaging numbers on the younger leaves at Logan and at Spanish Fork.

Amphorophora rubi Kaltenbach

A few specimens of this aphid were collected on strawberries at Morgan, June 30, 1925.

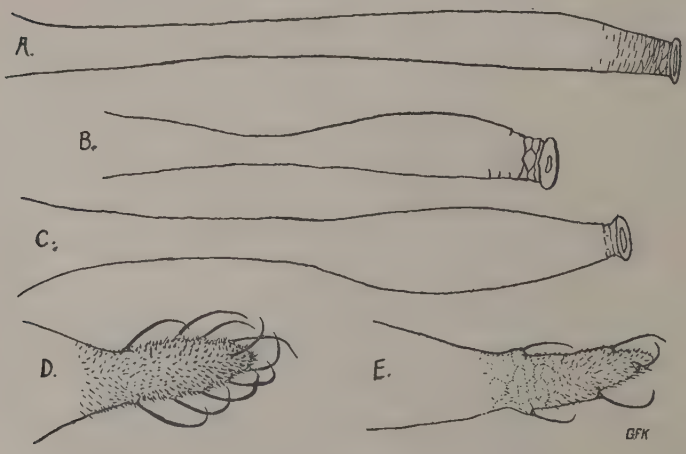


Figure 1

A, cornicle of alate *Amphorophora nervata* (Gillette); B, cornicle of alate *A. nigricornis* n. sp.; C, cornicle of alate *A. halli* n. sp., D, cauda of alate *A. nigricornis* n. sp.; E, cauda of alate *A. halli* n. sp.

FURTHER NOTES ON SOME SPECIES OF CERAMBYCIDÆ (COL.) FROM THE SOUTHERN PORTION OF VANCOUVER ISLAND, B. C., WITH DESCRIPTIONS OF SOME NEW VARIETIES

BY G. A. HARDY AND W. H. A. PREECE

In a previous paper published in this quarterly,[1] the habits of certain Cerambycids indigenous to Vancouver Island were discussed, and the following notes may be regarded as a continuation of that paper.

A little serious systematic work has been done with regard to the local species, and in consequence it has been found that there are a number of well-defined forms existent here which appear deserving of names. Several of these forms are described in the following notes.

Prionus californicus Mots.

It may be of interest to record the possible fecundity of this species. A female distended with ovæ was dissected and ascertained to contain approximately 1200. If this is the normal condition, and all are fertile, there must be a heavy mortality or an efficient parasite attendant, otherwise we should expect them to be much more common than seems to be the case.

The larvæ have occasionally been found in the base of fence posts, of balsam fir, below the surface of the ground, and in one case they were taken in the wood of a section of balsam (*Abies grandis* Lindl.), also below ground. When full-fed they appear to take to wandering about prior to pupation. A pupa was dug up in a garden in July, about three inches below the surface and at some distance from any wood or root.

Tetropium velutinum Lec.

Definite data regarding a host tree has been obtained. A specimen was taken at the exit of its burrow, from which it was just emerging, in a stump of Douglas fir (*Pseudotsuga mucronata* Raf.) by A. Nicholls, Tod Inlet, May 20, 1926.

---

1 Pan-Pacific Entomologist, Vol. III, p. 34.

EUMICHTHUS ŒDIPUS Lec.

Eumichthus œdipus ater Hardy and Preece, var. nov.

Eumichthus œdipus ruber Hardy and Preece, var. nov.

As the name implies, var. *ater* is a melanotic form of this species, having the entire prothorax and basal area of the elytra black or nigro-piceous, but very typical in all other respects. A series of five specimens all taken at **Sidney, B. C.,** by W. H. A. Preece, the type ♂, June 18, 1926, the paratypes all ♀, June 5 to 22, 1926, respectively.

Type in collection of Mr. Preece.

Var. *ruber* may be regarded as an albinistic form, the antennæ, legs, entire prothorax and basal area of the elytra rufous, the median and basal areas of the elytra piceous with fasciæ as in the typical form.

Type a unique ♂ taken at **Sidney, B. C.,** June 23, 1926, by W. H. A. Preece, in collection of Mr. Preece.

In a series of nearly ninety specimens collected at Sidney, B. C., between June 5 and 23, 1926, the bulk conformed to type, and, with the exception of the six specimens constituting the two above-described varieties, showed scarcely any variation, certainly none that could be considered as forming any annectant links between the species and the varieties.

It seems probable that these two varieties represent the limit the species is likely to reach in the directions of melanism and albinism alike.

Although this species, which was originally described from Vancouver Island, has a wide distribution, having been taken at Skidegate, Q. C. I. (Hopping) and Humboldt County, California (Van Dyke), it does not appear ever to have been previously taken in anything approaching series. Incidentally it may be stated that until this year no Vancouver Island record is known since the beginning of the century.

From the observed habits of the species it is considered that its scarcity may be more apparent than real. In the first place it is extremely local; the whole series was taken on a patch of ground less than half an acre in extent, and no others were taken either in the immediate vicinity or elsewhere on Vancouver Island, though careful search was prosecuted in many other localities where similar conditions prevailed. In the second place the habits of this beetle are peculiar and render it

liable to be overlooked by anyone not familiar with its behavior. Every specimen was taken from a flower head of *Spiræa discolor* Pursh, nearly all of them being in, rather than on, the flower head, which necessitated very careful search, since the beetle was frequently invisible until the flower head was opened up. Even when visible, careful scrutiny was necessary, as it was frequently associated with several species of ants, to some of which it bore a close superficial resemblance, and crawled around the flower heads in much the same manner. Though exceedingly active this little longhorn exhibits a marked disinclination to take flight; when interfered with it drops to the lower foliage and after a few moments climbs back up the branches to the flower head.

Strangalia obliterata (Hald.)

This species has been discovered boring in dead balsam (*Abies grandis* Lindl.). Several imagines and pupæ were taken from the wood in the latter part of June.

The larvæ, at any rate in the latter part of their existence, feed in the heartwood, galleries parallel to the grain being excavated to the depth of an inch or slightly more. In every case examined the larva had pupated at the top of a gallery without making any visible pupal cell, or provision for the egress of the imago, which presumably has to gnaw its own way out.

The dead balsam stump in which most of the above observations were made also harbored a number of specimens of *Ulochætes leoninus* Lec.

Strangalia obliterata (Hald.) if not actually the most abundant local Cerambycid is certainly the species most in evidence during the summer months. In early summer it frequents the flowers of *Spiræa discolor* Pursh and later can be found flying in the sunshine in any open space.

Leptura matthewsi Lec.

Remains of this species were taken at exit of burrow in stump of cedar (*Thuja plicata* Don.). The larvæ work in the heartwood boring partially through the bark, the adult completing the exit. The pupal cell was close to the bark, at an approximate angle of 45 degrees to the grain of the wood. The exit holes of several specimens were evident about one foot

from the ground; the young larvæ would appear to feed close to the root; the final portion of burrow was in the heartwood, approximately one inch below the surface, and ascending from the base of the stump.

PHYMATODES ÆNEUS Lec.

Several specimens have been taken from caged Douglas fir, (*Pseudotsuga mucronata* Raf.). A number have also been obtained running among the branches of Douglas fir slash.

PHYMATODES VULNERATUS Lec. and

Phymatodes vulneratus nigrescens Hardy and Preece var. nov.

The variety *nigrescens* differs from the typical form by the elytra being uniformly nigro-piceous with the exception of the fasciæ, and the femora being nigro-piceous instead of castaneous.

Type ♂, taken at **Sidney, B. C.,** May 12, 1926, by W. H. A. Preece, in his collection. *Paratypes* 4 ♂, 5 ♀, taken at Sidney, April 26 to May 23, 1926, by W. H. A. Preece.

A series of some forty specimens taken at Sidney, B. C., between April 13 and May 23, 1926, showed the species and varieties to be present in equal numbers. Representatives of species and variety were several times taken in coitu.

In a previous paper to which allusion has already been made, brief mention was made of the habits of this species. It was therein stated that only one burrow was found leading to or from the pupal cell; this statement it is necessary to qualify, for such is the case only when the species bores in branches of considerable size. When branches of a diameter of one to one and a half inches are infested, it has been found that the larva when ready to pupate bores down through the heartwood to the pith, where it forms a pupal cell by removing sufficient pith, and then bores again to the inside of the bark from the end of the pupal cell opposite that by which it entered, the two burrows and cell constituting three sides of a rectangle. As can readily be imagined this practice seriously weakens the branch. On several occasions after high winds, green and healthy-looking boughs were found on the ground which had broken off at spots thus weakened, the pupal cell showing at the break.

This species has been found infesting both local maples, *Acer macrophyllum* Pursh and *Acer glabrum* Torr.

PHYMATODES DECUSSATUS Lec. and
PHYMATODES DECUSSATUS OBLIQUUS Csy.

Phymatodes decussatus latifasciatus Hardy and Preece, var. nov.

Form of variety *latifasciatus* in every respect as in the species, thorax and base of elytra either piceous or fuscous. The anterior and posterior fasciæ coalesced to form a broad white band, sutural line black, broader posteriorly, elytral apices black. In the black phase the anterior margin of fascia is narrowly edged with rufous. Sometimes the fusion of fasciæ is not so complete, resulting in a wider sutural line medially and a longitudinal fuscous streak near lateral margin of fasciæ.

Described from six males and one female, six of the black form including the type, one of the rufous phase.

Type, **Mount Tolmie, V. I.,** 12. V. 26, in the collection of Mr. Hardy. *Paratypes,* Uplands, V. I., 20. V. 26; Mount Tolmie, V. I., 8. V. 26; 12. V. 26; 14. VI. 26; 3. VII. 26; 5. VII. 26. From Garry oak (*Quercus garryana*). All taken by G. A. Hardy.

The species and variety *obliquus* Csy. were seen in large numbers on dead Garry oak trees at the above mentioned localities, the following notes appertaining to Mount Tolmie. Adults were first abroad on April 8, thence increasing until the zenith was reached during the middle of May, when many hundreds must have emerged; throughout June their numbers continued unabated; during the early part of July they declined rapidly, until on July 13 only two individuals were seen.

At the height of their activity they were literally swarming all over the trees in question, strongly suggesting ants by their activity and superficial appearance. They were emerging from every part of the tree, the faint rasping of the jaws of the adults as they gnawed their way to freedom being distinctly audible. Flight was rarely indulged in, and then only on very hot days, a slight buzzing sound was emitted when so engaged; they move quickly but with little control over direction, and alight abruptly.

It was estimated that from 75 per cent to 90 per cent were of the variety *obliquus,* the males predominating by approximately 20 per cent. Every combination of color and markings in the species and varieties were observed in coitu.

The life-cycle appears to occupy one year. Boughs of Garry oak known to have been freshly cut in the spring of 1925 were closely watched throughout the season; half-grown larvæ were seen under the bark in November. Full-grown larvæ were found on February 13, 1926, with many in the pupal cells; no pupæ were noted before April 5, from which fact the pupal stage would not seem to be of long duration. Many larvæ pupate at the end of the gallery between the bark and wood, not boring into the heartwood for the purpose as is commonly the case.[2]

A large Clerid, *Charessa elegans* Horn, was observed demolishing a specimen of this species; as several of the former were observed from time to time, they may be an important auxiliary in checking an even greater increase of the Phymatodes than was the case this season.

Possibly the mild and comparatively dry preceding winter is responsible for the large numbers observed, by reducing the liability to mould and other diseases, a factor of some importance affecting wood-boring insects.

NEOCLYTUS CONJUNCTUS Lec.

In the paper already referred to, a note was included dealing with the habits of this species as a borer in Garry oak (*Quercus garryana* Dougl.). The following observations are concerned with it as a borer in madrone (*Arbutus menziesii* Pursh.).

On May 14, 15, and 16, 1925, a number of females were taken ovipositing on recently felled madrone logs, diameter three to six inches. Freshly emerged imagines and pupæ were removed from pupal cells in these logs in the middle of October, 1926. Had these adults been left undisturbed, they would have emerged from the logs in April or May, 1927. This two-year life cycle had been strongly suspected, but previously definite proof had been lacking.

The Arbutus logs were sawn into convenient length and kept under observation. From time to time a length was cut up and examined.

---

2 For further detail see Pan-Pacific Entomologist, Vol. III, p. 38.

The ovæ are deposited in small batches in flaws in the bark and for the first few weeks after hatching the larvæ feed side by side in the sapwood. On entering the heartwood this regimental existence is terminated, though the larvæ continue to bore in close proximity to one another, literally honey-combing the heartwood with their galleries to a depth of some two inches. The larvæ appeared to be practically full grown at the end of the first summer. During the winter they were exceedingly sluggish and seemed to suspend all activities. During the second summer they continued to feed until the latter part of September, when pupation took place. The duration of the pupal stage being brief, varying from two to four weeks, the imagines emerging from the pupæ from the middle of October onward.

A comparison of larvæ when about to pupate and at the end of the first summer shows so little difference between the two that it is considered probable that the species finds a one-year life cycle adequate in the more southerly part of its range.

Full-fed dormant larvæ have also been taken in dead branches of Garry oak (*Quercus garryana* Dougl.) during the spring and summer of 1926. Adults were found in the same wood along with the larvæ in April and May, but later only larvæ occurred. An examination of branches again in October resulted in the finding of recently formed adults which will normally appear in the spring of 1927.

Capsus externus H. S.

In *Entomological News* for October, 1926, Dr. H. H. Knight records the supposed "rediscovery" of *Capsus externus* H. S. He had apparently overlooked the fact that Dr. Reuter recorded this species as a variety of *Paracalocoris scrupeus* Say in 1909 (Neark. Capsiden, p. 39). I have in my collection a specimen from Delaware Water Gap, Pa., determined for me by Dr. Reuter in 1908 as "*P. scrupeus v. externus* H. S.," and it was so entered in my Check List of 1906 and in my Catalogue of 1917. I possess a second specimen taken by me at Salamanca, N. Y., July 24, 1911. While not a "rediscovery" Dr. Knight's notes are most valuable in giving this form specific standing.—E. P. Van Duzee.

SOME INSECTS FROM THE ADOBE WALLS OF THE OLD MISSIONS OF LOWER CALIFORNIA

BY E. O. ESSIG

University of California, Berkeley, California

For a number of years Prof. George W. Hendry has been making a study of the grains and seeds used in the early mission days in California. The seeds are obtained by dissolving in water the old adobe bricks used in constructing the missions and carefully washing the mud through screens and then sorting out the seeds. In this manner he has been able to find a large assortment of various seeds. Last summer (July, 1926) he conducted similar investigations in Lower California and in addition to seeds he preserved certain insects, whole or in parts, which he allowed me to study. While the amount of material is small, it is sufficient to show that much could be learned about the native insects as well as the destructive forms which occurred at the missions by a thorough study of insects in the adobe bricks such as Professor Hendry has made of seeds. Missions in Lower California from which specimens were secured are:

San Fernando de Vellicata, founded 1769

A specimen of a wingless cockroach similar to if not of the genus *Arenivaga.*

A portion of the head of one of the cuckoo wasps belonging to the family *Chrysididæ.*

Four anal segments, including the sting, of a very small immature scorpion. The four segments measure about 7.5 mm.

Portions of the cocoons of mud wasps which probably built their nests in the mud walls after construction.

San Vincente Ferrer, founded 1780

A spider beetle which Dr. E. C. Van Dyke believes to be *Ptinus agnatus* Fall and which he states lives in the roots of grasses. It is very probable that this beetle was incorporated in the adobe bricks along with the grass when the building was constructed. It was originally described from southern California.

Prothorax and portions of front legs of *Eleodes* sp.

Head and many cocoons or pupal skins of mud wasps.

Santo Domingo, founded 1775

This is one of the few missions which was continuously occupied from the time of its foundation until about 1906, when it was abandoned.

One well-preserved specimen each of the granary weevil, *Sitophilus granarius* (Linn.) (*Calandra granaria* Linn.), and the rice weevil, *Sitophilus oryzæ* Linn. (*Calandra oryzæ* Linn.). These were washed from the interior of adobe bricks. A head of wheat was taken from the mortar between two bricks which were well in the wall: the glumes were practically all present and in a good state of preservation. No kernels of wheat were present, but the lemma which enclosed the same showed plainly the work of some insect. This insect was apparently one or both of the weevils listed above, since an elytron of the rice weevil was still adhering to one of the glumes. From this evidence it appears that these weevils were common to the early missions of Lower California and were undoubtedly introduced into California by the Mission Fathers with the founding of the San Diego Mission in 1769.

These insects may have been incorporated into the bricks when they were originally made or some of them, as the mud wasps, may have built their cells in the adobe walls, and still others may have sought refuge in the holes and cracks thereof. In a careful and detailed study of the bricks these points could be ascertained.

BOOK NOTICE

The Insects of Australia and New Zealand. By R. J. Tillyard. 560 pp., 42 pl. Angus & Robertson, Sydney, Australia, 1926.

This is a most excellent general work on entomology for the students of this subject in that continent, having very excellent illustrations of many hundreds of local species as well as keys of families and terse descriptions of the more distinctive forms.

The book will be valuable to entomologists of other countries chiefly because of the general discussion of the structure of the larger groups and the accounts of their life histories, distribution, economics, classification and phylogeny.

The outstanding contribution is the original work on the venation of the wings. This is the first comprehensive presentation of this subject since the work of Comstock. At first glance it appears as though he simply adopted the system proposed by that author because he uses in general the same notation; but a closer study will show that his views are radically different

in many particulars. In three groups he tabulates the elements of the venation:

	Elements	*Comparison with Comstock System*	
		Identical	*Different*
Plecoptera, p. 59	21	5	16
Odonata, p. 68	17	4	13
Hymenoptera, p. 258	50	4	46

He estimates that in other orders that he has not fully studied, large changes will have to be made and points out some of them in Diptera and Hemiptera in regard to which he differs from Comstock.

Neither Comstock nor Tillyard have added to the understanding of the homologies within the Hymenoptera nor to the precision in expressing the characteristics of the venation in taxonomic work. It will now be necessary, if the symbols of either system are employed, to indicate whether they are used according to Comstock or to Tillyard, and likewise in the other orders.

Both authors use the Lepidoptera as the basis of their systems and the differences of opinion relate to a comparison of the other venations with the Lepidoptera. Perhaps Tillyard is right. His decisions are made with a full knowledge of Comstock's work at hand; but would it not be far better to return to the older standard nomenclature of Hymenopterous venation not dependent upon differences of views of successive students regarding interorder homologies.—C. W. Woodworth.

Pterosticus horni Lec.

This rare species, known to me only by the type, I have long been on the look out for. Recently I had an opportunity to stop over for a day near old Fort Tejon where John Xanthus de Vasey and Dr. George H. Horn stopped during the early days, and among other things took a small series of this species. This place I am now inclined to believe is the type locality, for the "Southeastern Sierra," as given by LeConte, could easily be stretched to include it. It is the only locality in that general territory where Doctor Horn collected.—E. C. Van Dyke.

THE SPECIES OF AMPHIZOA (COLEOPTERA)

BY EDWIN C. VAN DYKE

University of California, Berkeley, California

In the last number of this journal[1] I described as new a species of *Amphizoa* which differed greatly from the well-known *Amphizoa insolens* Lec., as well as from another species which I had labeled as *Amphizoa lecontei* Matth. This latter I now find was incorrectly named. The species which I described as *planata,* I also find agrees in every particular with the original description of *lecontei* and will, therefore, have to be reduced to synonymy. My wrongly identified species being without a name, and eminently distinct from both *insolens* and the true *lecontei.* I will now describe, and at the same time give a corrected key.

Key for the separation of the American species of Amphizoa Lec:

Elytra evenly convex from side to side.

Prothorax deeply sinuate in front of hind angles, in general broadest at middle and markedly crenulate along lateral margin anteriorly; color coal black; elytra very irregularly and coarsely rugose especially at sides; average length 12 mm. Alaska, British Columbia, Cascade and Sierra Nevada Mountains to Mount San Bernardino, California.....*insolens* Lec.

Prothorax hardly sinuate in front of hind angles, generally broadest at base; color black with sides of prothorax, elytral intervals and parts of underside somewhat rufous; elytra almost smooth; average length 14 mm. Northbend, Washington.....*striata* sp. nov.

Elytra flattened at middle; fifth interval strongly elevated; prothorax hardly sinuate in front of hind angles, in general broadest at base; color black or somewhat rufous in places; average length 12-13 mm. British Columbia through Rocky Mountains to Alberta, Idaho, and Wyoming.....*lecontei* Matth.

Amphizoa striata Van Dyke, new species.

Slightly larger in size than either *insolens* or *lecontei* and more convex; black with sides of prothorax, elytral intervals, margins of epipleuræ and legs somewhat rufous. Head with front longitudinally bisulcate, sparsely punctured behind, finely punctate and rugose in front; antennæ reaching beyond middle of prothorax, third seg-

1 A New Species of Amphizoa (Coleoptera), by Edwin C. Van Dyke, Pan-Pacific Entomologist, Vol. III, No. 3 (January, 1927), pp. 97, 98.

ment about twice as long as broad, outer segments about one and a half times as long as broad. Prothorax twice as broad as long; base truncate, apex deeply emarginate; sides hardly sinuate in front of hind angles, therefore almost straight to middle, thence strongly convergent to acute front angles, the hind angles subacute, the margin slightly crenulate; disk flattened with slightly impressed anterior and posterior transverse impressions, finely punctate and rugose. Elytra one-third longer than broad, broadly rounded at humeri, slightly arcuate at sides and gradually narrowed to apex; disk strongly evenly convex; striæ faintly impressed and punctured, marked by a series of quadrate black maculations, the intervals all distinctly defined by the lighter coloration; general surface almost smooth and slightly shining. Length, 14 mm.; breadth, 7 mm.

Holotype (No. 2463, Mus. Calif. Acad. Sci.) and three paratypes collected by myself on a log jam in a small stream entering the Snoqualamie river near **Northbend, Kings County, Washington,** July 11, 1920.

This species is slightly larger, more convex and much smoother than either *insolens* or *lecontei*. Its prothorax simulates that of the latter, but the hind angles are not so acute. Its color pattern is also quite distinctive and fairly constant in the four specimens examined.

Note on Oxybelus sp.

In the back-yard garden of my home in San Francisco I have been observing this quick fly-catching wasp. It was burrowing into the ground whilst, with its third pair of legs, it firmly grasped a stout fly (*Lucilia cæsar* L.). The victim was much larger, with its whole body projecting out behind the little wasp, presenting a very curious appearance. Oxybelus can easily be distinguished by remarkable structural characters, two broad scale-like forms (squamæ) projecting back from the metanotum, and a median long substantial spine borne by the base of the propodeum. Also the inner margin of the eyes are convex, and the submarginal and first discoidal cells of the anterior wings are confluent. It is probably a western form of *O. quadrinotatus* Say.—C. L. Fox.

A NEW WILLOW APHID FROM UTAH

BY GEORGE F. KNOWLTON*

Utah Agricultural Experimental Station

Neothomasia salicinigra Knowlton, n. sp.

This black Chaitophorinid was collected in Cedar Cañon on July 8, 1925. Winged and wingless forms were present on willow by the roadside, at an elevation of 7000 ft. The aphids were feeding on the bark of the smaller twigs, and the colonies were attended by ants *(Formica rufa)*.

While resembling *Neothomasia populicola* (Thomas) Baker, a very common form all over Utah, it differs in lacking the dark shading on the sides and ends of the wing veins, in having more slender antennæ with longer filament to VI and in having a narrower, slightly more elongate cauda.

Alate vivipara. Body black, rather broad, 1.35 to 1.75 mm. long; rostrum short; head broad and rounded in front; antenna black, except base of III, and armed with rather long, curved sensilla; III, .34 to .37 mm. long, with 8 to 10 wide-margined sensoria in irregular to scattered row; IV, .2 to .25 mm., with 0 to 3 sensoria; V, .17 to .21 mm., with usually 0 to 1 secondary sensoria (usually none) besides the usual primary sensorium; VI, .29 to .36 (.09 + .2 to .1 + .26) mm.; legs rather short, blackish to black; wing venation typical; veins dark with membrane slightly dusky; cornicles short, .09 to .11 mm. long, with closed reticulations over much of the surface and with a moderate flange; cauda rounded to slightly elongate, and without constriction.

Apterous vivipara. Black with light streak showing along middorsal line; dorso-ventrally compressed; 2 mm. long and half as broad; head rounded in front and armed with long, tapering sensilla; antenna blackish to black, except III and base of IV which are lighter colored, armed with long tapering sensilla and lacking secondary sensoria; antennal III, .25 to .27 mm. long; IV, .19 to .2 mm.; V, .15 mm.; VI, .29 (.1 + .19) mm.; legs moderately short and black; cornicles truncate, with closed reticulations over much of surface, and with moderate flange; cauda rounded and rather short.

* The writer wished to thank Mr. P. W. Mason and Prof. O. F. Oestlund for their opinions concerning this form.

THE PAN-PACIFIC ENTOMOLOGIST
Published quarterly by the Pacific Coast Entomological Society
in co-operation with the California Academy of Sciences
E. P. Van Duzee, Editor S. B. Freeborn, Ph.D., Treasurer

EDITORIAL COMMENT

Authors sending drawings for publication in the Pan-Pacific Entomologist are requested to state on the back of the drawings should they wish them returned, and to enclose postage for such return. Manuscripts for publication should be typewritten on letter sized paper (about 8½ by 11 inches) and always *double-spaced*. All titles and other headings should be in ordinary type. Do not underline or use caps or colored ribbon. Names of insects and plants occurring in the text can be underlined as well as any words the author wishes to have set in italics for emphasis. All manuscripts should be carefully read before mailing so there will be no correction of diction made on the proof.

It is with sincere pleasure that we learn of the return to California of our collaborator Dr. Frank R. Cole. We understand that he is now associated with the work of U. S. Bureau of Entomology on bulb fly investigations and is stationed at the government laboratory at Santa Cruz, California. Dr. Cole has done much to help build up the collection of Diptera at the California Academy of Sciences and for a number of years has been connected with the work of the Academy as Associate curator in Dipterology.

The California Academy of Sciences has recently received by exchange a series of paratypes from Dr. H. H. Knight representing about 175 species of the Hemipterous family Miridæ described by Dr. Knight and not before represented in its collection. This exchange will do much to enhance the value of the already large collection of Hemiptera in the possession of the Academy.

The four numbers of Volume III of the Pan-Pacific Entomologist were mailed on the following dates: No. 1 on September 29, 1926; No. 2, on December 8, 1926; No. 3, on April 13, 1927 and No. 4, on June 9, 1927.

Adobe walls, insects from, 194.
Agnippe crinella Kfr., 137.
Agapostemon, key, 159.
angelicus Ckll., 156.
borealis Crwfd., 156.
cockerelli Crwfd., 155.
californicus Crwfd., 158.
coloradensis, Crwfd., 153.
epichryseus Ckll., 154.
femoratus Crwfd., 157.
martini Ckll., 153.
melliventris Cress., 154.
radiatus Say, 157.
splendens Lep., 154.
subtilior Ckll., 157.
texanus Cress., 157.
vandykei Ckll., 155.
virescens Fabr., 153.
Airamia B. and B., 73.
Alaptus **psocidivorus** Gah., 180, 182.
Alaskan Coleoptera, 59.
Alexander, C. P., papers by, **77**, 143.
Amiana Dyar, 64.
Amphizoa, key, 97, 197.
planata V. D., 98.
striata V. D., 198.
Amphorophora, 185.
halli Knlt., 185
nervata Gill., 186.
nigricornis Knlt., 185.
rubi Knlt., 186.
Anacæna, 55.
Anaphothrips, 22.
enceliæ Mltn., 24.
secticornis Tybm., 173.
stanfordi Mltn., 23.
Ankothrips **æqualis** Mltn., 20.
gracilis Mltn., 19.
Anthophora **dulcifera** Ckll., 83.
melanops Ckll., 84.
tsushimensis Ckll., 84.
urens Ckll., 83.
Anuraphis **madronæ** Essig, 42.
Apple pests, 91.
Arachnis aulæa Gey., 17.
pompeia Druce, 17.
Aradus **patibulus** V. D., 140.
taylori V. D., 140.
vandykei V. D., 139.
Archips argyrospila Wlk., 91.
Arctiidæ, 16.
Argyrotænia franciscana Wals., 91.
Aristotelia argentifera Bsk., 162.
Atethmia Hbn., 70.
Augoclora fervida Sm., 161.
ignita Sm., 161.
pomoniella Ckll., 162.

Balaninus, 200.
Barathra Hbn., 65.
Barnes and Benjamin, papers by, 12, 13, 16, 41, 64, 74, 110.
Barnes, William, personals, 48.
Blackman, M. W., personals, 95.
Blaisdell, F. E., paper by, 163.
Blatchley, W. S., book by, 96.
Bombomelecta **callura** Ckll., 58.
Book notices, 95, 96, 179, 195.
Borden, A. D., paper by, 91.
Brachycosmia Hmps., 69.
Bryomima fallax Hmps., 111.
Buchholzia B. and B., 68.
Buprestis fremontæ Brk., 48.

Callidium **vancouverense** V. D., 104.
Capsus externus H. S., 193.
Cassididæ, larva, 169.
Cea Grote, 67.
Celerio lineata Fab., 145.
Centris atripes Mocsy., 83.
Centrodera, key, 102.
blaisdelli V. D., 102.
pilosa V. D., 101.
Cerambycidæ, 34, 99, 187.
Cercyonis sthenele Bdv., 48.
Certila Wlk., 66.
Chironomid leaf miner, 135.
Chirothrips similis Bgnl., 21.

Chrysops, 200.
Cicindela westbournei Wlls., 114.
Cirrœdia Gn., 70.
Clark, B. P., personals, 48.
Coccotrypes dactyliperda Fab., 151.
Cockerell, T. D. A., papers by, 58, 80, 153.
Codling moth, 44, 93.
Cœlosattus Blaisd., 166.
fortineri Blaisd., 167.
Cole, F. R., personals, 200.
Coleoptera of Alaska, 59.
Colletes, japanese, 82.
kobensis Ckll., 81.
Coloradia **bonniwelli** B. and B., 15.
chiricahua B. and B., 15.
davisi B. and B., 13.
duffneri B. and B., 15.
lindseyi B. and B., 14.
luski B. and B., 13.
Conacontia Sm., 72.
Cottle, J. E., paper by, 75.
Crampton, G. C., paper by, 115.
Crenitis Bdl., 53.
Crenitulus Wnts., 54.
Crocisa gemmata Ckll., 90.
japonica Fries, 90.
Curculio, 200.
Cymatodera angustata Spin., 45.

Dasymolophilus **subnudus** Alex., 77.
Dermaptera of Utah, 178.
Dolichopodidæ, 4, 146.
Dolichopus **oregonensis** V. D., 148.
Draudtia B. and B., 66.
Drepanothrips reuteri Uzel, 22.
Dyslobus granicollis Lec., 63.
Dysstroma hewlettaria Wrgt., 113.

Editorials, 47, 95, 152, 200.
England, visit to, 149.
Epeolus **tsushimensis** Ckll., 89.
Ergates spiculatus Lec., 34.
Essig, book by, 95.
Essig, notes by, 43, 92, 109, 145.
Essig, papers by, 42, 194.
Euæsthetus **pacificus** Fall, 62.
Eubaphe ferruginosa Wlk., 16.
Eucirrœdia Grt., 70.
Eumichthus **ater** H. and P., 188.
œdipus Lec., 188.
ruber H. and P., 188.
Euparthenos **osiris** B. and B., 74.
Euphydryas quino Behr, 75.
Eupolia Sm., 64.
Eupteryx Curt., 45.
Eurotype Hamp., 71.

Fall, H. C., paper by, 59.
Ferris and Nissen, paper by, 169.
Flanders, S. E., papers by, 44, 93.
Fox, English insects, 94.
Fox, C. L., paper by, 149.
Fox, C. L., personals, 94.
Freeborn, S. B., personals, 95.

Gahan, A. B., paper by, 180.
Gelechia occidentella Chmb., 138.
panella Busk, 137.
Generic names, 151.
Generic Notes, Cuculliinæ, 110.
Generic synonymy, 64.
Gnorimoschema chenopodiella Busk, 138.
Gonomyia **hesperia** Alex., 78.
Græperia Grt., 71.
Grylloblattidæ, 115.

Haplothrips fasciculatus Crwf., 174.
Hardy and Preece, papers by, 34, 187.
Heliodora Neum., 71.
Hemerocampa vetusta Bdv., 91.
Hemibryomima B. and B., 111.
Hood, J. D., paper by, 173.
Hoplitina hesperia Crwf., 87.
Huguenin, J. C., necrology, 152.
Hydrobiini, 49.

Hydrobius Leach, 50.
Hydrocyclus Sharp, 52.
Hydrophorus Fall, key, 5.
list of species, 10.
vandykei, V. D., 4.
Hylæus nunenmacheri Brdwl., 80.
tridentatus Ckll., 80.

Jones, W. W., note by, 135.

Karnyothrips Wtsn., 175.
flavipes Jones, 176.
Keifer, H. H., papers by, 136, 162.
Knaus, W., paper by, 114.
Knight, paratypes, 200.
Knowlton, G. F., papers by, 185, 199.
Koebele Collection, 47.

Laccobius Er., 50.
Lemmeria B. and B., 69.
Leptura dolorosa Lec., 36.
matthewsi Lec., 189.
Limnophila **nemoptera** Alex., 143.
Listronotus obliquus Fab., 63.

McGregor, E. A., paper by, 29.
Mamestra Ochs., 65.
Martin, J. O., personals, 46, 152.
Megachile doederleinii Fr., 85.
humilis Sm., 86.
kagiana Ckll., 85.
remotissima Ckll., 86.
Melanophila consputa Lec., 41.
Melissodes **ablusa** Ckll., 85.
Mezira emarginata Say, 142.
granulata Say, 142.
mœsta St., 141.
reducta V. D., 142.
Microlepidoptera, 136, 162.
Micropeza, key, 2.
californica V. D., 1.
lineata V. D., 2.
Mnemonica cyanosparsella Wms., 138.
Molophilus **sackenianus** Alex., 78.
Moths from Mill Valley, 33.
Moulton, D., paper by, 19.
Mymaridæ, a new, 180.

Namangana, Staud., 64.
Necydalis lævicollis Lec., 37.
Neleucania Sm., 67, 68.
Neoclytus **angelicus** V. D., 107.
basalis V. D., 106.
conjunctus Lec., 39, 192.
magnus Schf., 109.
vanduzeei V. D., 107.
zebratus, V. D., 108.

Neothomasia **salicinigra** Knlt., 199.
Neuroctenus simplex Uhl., 142.
Nomada **koreana** Ckll., 88.
Nomia **froggatti** Ckll., 82.
Odontanaphothrips Mltn., 24.
Oeme **hirsuta** V. D., 99.
Ommatostola Grt., 68.
Opismus 4-lineatus Mann., 34.
Orthoptera of Utah, 178.

Pandemis pyrusna Krft., 91.
Panurginus **melanocephalus** Ckll., 80, 148.
Paracalocoris externus H. S., 193.
Paraclius **keiferi** V. D., 146.
magnicornis V. D., 146.
Paracretonia Dyar, 72.
Paracymus Thoms, 56.
Paramiana B. and B., 64.
Parvaspis basalis Rets., 87.
Perimegatoma **giffardi** Blaisd., 163.
Pest gauge, 29.
Phymatodes æneus Lec., 190.
decussatus Lec., 38, 191.
latifasciatus H. and P., 191.
nigrescens H. and P., 190.
vulneratus Lec., 38, 190.
Platypolia Grt., 70.
Plectura spinicauda Mann., 39.
Prionus californicus Mots., 187.
Properigea B. and B., 112.

Prosopoanaphothrips Mltn., 22.
Protoxæa gloriosa Fox, 80.
Pseudanthœcia Sm., 110.
Pseudobryomima B. and B., 111.
Psiloconopa **mormon** Alex., 144.
Pterosticus horni Lec., 196.
Pygarctia albistrigata B. and M., 18.
murina Strch., 18.

Raphia Hbn., 66.
Recurvaria **baccharíella** Kfr., 136.
Reticulitermes hesperius Bks., 92.
Rhagium lineatum L., 35.
Rhaphium **æqualis** V. D., 147.
Sabulodes **cottlei** B. and B., 41.
Saligena Wlk., 66.
Semanotus ligneus Fab., 37.
thujæ V. D., 103.
Slevin Collection, 152.
Sphingidæ, collection of, 48.
Spruyt, F. J., paper by, 182.
Stenus, Alaskan, 59.
frigidus Fall, 59.
exploratus Fall, 61.
Strangalia obliterata Hld., 189.
Styloxus **ruficeps**, V. D., 100.
Synaphæta guexi Lec., 40.

Tanner, V. M., paper by, 178.
Termites swarming, 92, 109.
Termopsis angusticollis Hgn., 92.
Tethea Ochs., 70.
Tetropium velutinum Lec., 187.
Therasea Grt., 71.
Thrips **heraclei** Mltn., 25.
Thysanoptera, 19, 173.
Tillyard, book by, 195.
Tipulidæ, 77, 143.
Tmetocera ocellana Sch., 91.
Tornacontia Sm., 71.
Trachykele hartmani Burk, 48.
Trichochrous **muri** Blaisd., 165.
Trichocosmia Grt., 64.
Typhlocyba Germ., 45.
Ulochætes leoninus Lec., 36.
Van Duzee, E. P., notes by, 33, 45, 151, 172, 193.
Van Duzee, E. P., paper by, 139.
Van Duzee, M. C., papers by, 1, 4, 146.
Van Dyke, E. C., notes by, 41, 63, 151, 196.
Van Dyke, E. C., papers by, 97, 99, 197.
Van Dyke, E. C., personals, 46.

White-lined Sphinx, 145.
Winters, F. C., paper by, 49.
Woodworth, C. E., note by, 195.
Wright, W. S., paper by, 113.

Xestoleptura crassipes Lec., 35.
Xylocopa **thompsoni** Ckll., 87.
Xylomyges **vanduzeei** B. and B., 12.
Xylotrechus undulatus Say, 39.

Yosemite Museum, 43.
Zoological nomenclature, 172.

Vol. III July, 1926 No. 1

ENT. BUR.
16 OCT. 1926

THE PAN-PACIFIC ENTOMOLOGIST

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

CONTENTS

VAN DUZEE, M. C., THE GENUS MICROPEZA IN NORTH AMERICA 1
VAN DUZEE, M. C., THE NORTH AMERICAN SPECIES OF HYDROPHORUS . . 4
BARNES AND BENJAMIN, A NEW XYLOMYGES FROM CALIFORNIA 12
BARNES AND BENJAMIN, NEW SPECIES OF COLORADIA 13
BARNES AND BENJAMIN, SYNONYMIC NOTES ON ARCTIIDÆ 16
MOULTON, NEW CALIFORNIA THYSANOPTERA 19
MCGREGOR, A DEVICE FOR DETERMINING THE RELATIVE DEGREE OF INSECT OCCURRENCE 29
HARDY AND PREECE, NOTES ON SOME SPECIES OF CERAMBYCIDÆ 34
BARNES AND BENJAMIN, A NEW FORM OF SABULODES CABERATA 41
ESSIG, THE MADRONA APHIS 42
FLANDERS, INSECT ENEMIES OF THE CODLING MOTH 44
VAN DUZEE, E. P., TYPHLOCYBA VS. EUPTERYX 45
EDITORIAL COMMENT 47

San Francisco, California
1926

THE PAN-PACIFIC ENTOMOLOGIST

Published quarterly in July, October, January and April by the Pacific Coast Entomological Society in co-operation with the California Academy of Sciences.

Annual subscription $2.00 in advance for the United States and Canada; $2.25 for foreign countries. Subscriptions should be sent to the treasurer, Dr. F. E. Blaisdell,* 1520 Lake Street, San Francisco, California. Make checks payable to the "Pan-Pacific Entomologist."

Manuscripts for publication and communications regarding non-receipt of numbers, change of address, requests for sample copies, etc., should be addressed to the editor, Mr. E. P. Van Duzee, California Academy of Sciences, Golden Gate Park, San Francisco, California. Advertisements will be accepted for the back cover pages. For rates address the editor or treasurer.

Twenty-five copies of author's extras will be furnished free on request. Additional copies will be supplied at cost of publication if a request is received with the manuscript.

Subscribers failing to receive their numbers will please notify the editor at as early a date as possible.

PUBLICATION COMMITTEE, PAN-PACIFIC ENTOMOLOGIST

E. O. Essig, *Chairman*

G. F. Ferris — R. A. Doane

E. C. Van Dyke — Grant Wallace

REGIONAL MEMBERS

W. W. Henderson, Logan, Utah

J. C. Chamberlin, Riverside, California

E. P. Van Duzee, *Editor*

E. C. Van Dyke, *Associate Editor*

F. E. Blaisdell, Sr., *Treasurer*

Published at the California Academy of Sciences, Golden Gate Park, San Francisco, California.

Entered as second-class matter, February 10, 1925, at the postoffice at San Francisco, California, under Act of August 24, 1912.

---

* After January 1, 1927, the address of the treasurer will be: Dr. Stanley B. Freeborn, Agriculture Hall, University of California, Berkeley, California.

Vol. III October, 1926 No. 2

THE PAN-PACIFIC ENTOMOLOGIST

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

CONTENTS

WINTERS, NOTES ON THE HYDROBIINI OF BOREAL AMERICA 49
COCKERELL, AN INTERESTING NEW BEE FROM CALIFORNIA 58
FALL, ADDITIONS TO LIST OF ALASKAN COLEOPTERA 59
BARNES AND BENJAMIN, GENERIC SYNONYMY 64
BARNES AND BENJAMIN, A NEW SUBSPECIES OF PARTHENOS NUBILIS . . 74
COTTLE, EUPHYDRYAS QUINO BEHR 75
ALEXANDER, THREE UNDESCRIBED ERIOPTERINE CRANE-FLIES 77
COCKERELL, SOME BEES IN THE COLLECTION OF THE CALIFORNIA ACADEMY OF SCIENCES 80
BORDEN, APPLE INSECT PESTS IN CALIFORNIA 91
ESSIG, SWARMING TERMITES 92
FLANDERS, VARIATIONS IN SEASONAL DEVELOPMENT OF THE WALNUT CODLING MOTH 93
EDITORIAL 95

San Francisco, California
1926

THE PAN-PACIFIC ENTOMOLOGIST

Published quarterly in July, October, January and April by the Pacific Coast Entomological Society in co-operation with the California Academy of Sciences.

Annual subscription $2.00 in advance for the United States and Canada; $2.25 for foreign countries. Subscriptions should be sent to the treasurer, Dr. Stanley B. Freeborn, University Farm, Davis, California. Make checks payable to the "Pan-Pacific Entomologist."

Manuscripts for publication and communications regarding non-receipt of numbers, change of address, requests for sample copies, etc., should be addressed to the editor, Mr. E. P. Van Duzee, California Academy of Sciences, Golden Gate Park, San Francisco, California. Advertisements will be accepted for the back cover pages. For rates address the editor or treasurer.

Twenty-five copies of author's extras will be furnished free on request. Additional copies will be supplied at cost of publication if a request is received with the manuscript.

Subscribers failing to receive their numbers will please notify the editor at as early a date as possible.

PUBLICATION COMMITTEE, PAN-PACIFIC ENTOMOLOGIST

E. O. Essig, *Chairman*

G. F. Ferris — R. A. Doane

E. C. Van Dyke — Grant Wallace

REGIONAL MEMBERS

W. W. Henderson, Logan, Utah

J. C. Chamberlin, Riverside, California

E. P. Van Duzee, *Editor*

E. C. Van Dyke, *Associate Editor*

S. B. Freeborn, *Treasurer*

Published at the California Academy of Sciences, Golden Gate Park, San Francisco, California.

Entered as second-class matter, February 10, 1925, at the postoffice at San Francisco, California, under Act of August 24, 1912.

E & A

Vol. III January, 1927 No. 3

THE PAN-PACIFIC ENTOMOLOGIST

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

[illegible]
20[illegible]
[illegible]

CONTENTS

VAN DYKE, A NEW SPECIES OF AMPHIZOA 97
VAN DYKE, NEW SPECIES AND SUBSPECIES OF WEST AMERICAN CERAMBYCIDÆ 99
BARNES-BENJAMIN, GENERIC NOTES, CUCULLIINÆ 110
WRIGHT, A NEW GEOMETER FROM SAN DIEGO COUNTY 113
KNAUS, A WASHINGTON RECORD FOR CICINDELA WESTBOURNEI 114
CRAMPTON, ABDOMINAL STRUCTURES OF THE GRYLLOBLATTIDÆ 115
KEIFER, CALIFORNIA MICROLEPIDOPTERA 136
VAN DUZEE, E. P., NOTES ON WESTERN ARADIDÆ 139
ALEXANDER, UNDESCRIBED SPECIES OF TIPULIDÆ FROM UTAH 143
ESSIG, THE WHITE-LINED SPHINX 145
VAN DUZEE, M. C., FOUR NEW DOLICHOPIDS 146
FOX, NOTES ON A TRIP TO ENGLAND 149
EDITORIAL 152

San Francisco, California
1927

THE PAN-PACIFIC ENTOMOLOGIST

Published quarterly in July, October, January and April by the Pacific Coast Entomological Society in co-operation with the California Academy of Sciences.

Annual subscription $2.00 in advance for the United States and Canada; $2.25 for foreign countries. Subscriptions should be sent to the treasurer, Dr. Stanley B. Freeborn, University Farm, Davis, California. Make checks payable to the "Pan-Pacific Entomologist."

Manuscripts for publication and communications regarding non-receipt of numbers, change of address, requests for sample copies, etc., should be addressed to the editor, Mr. E. P. Van Duzee, California Academy of Sciences, Golden Gate Park, San Francisco, California. Advertisements will be accepted for the back cover pages. For rates address the editor or treasurer.

Twenty-five copies of author's extras will be furnished free on request. Additional copies will be supplied at cost of publication if a request is received with the manuscript.

Subscribers failing to receive their numbers will please notify the editor at as early a date as possible.

PUBLICATION COMMITTEE, PAN-PACIFIC ENTOMOLOGIST

E. O. Essig, *Chairman*

G. F. Ferris — R. A. Doane

E. C. Van Dyke — Grant Wallace

REGIONAL MEMBERS

W. W. Henderson, Logan, Utah

J. C. Chamberlin, Riverside, California

E. P. Van Duzee, *Editor*

E. C. Van Dyke, *Associate Editor*

S. B. Freeborn, *Treasurer*

Published at the California Academy of Sciences, Golden Gate Park, San Francisco, California.

Entered as second-class matter, February 10, 1925, at the postoffice at San Francisco, California, under Act of August 24, 1912.

EKA TPJ

Vol. III April, 1927 No. 4

IMP. BUR.
27 JUN 1927

THE PAN-PACIFIC ENTOMOLOGIST

Published by the
Pacific Coast Entomological Society
in co-operation with
The California Academy of Sciences

CONTENTS

COCKERELL, BEES OF THE GENERA AGAPOSTEMON AND AUGOCHLORA . . 153
KEIFER, CALIFORNIA MICROLEPIDOPTERA, II 162
BLAISDELL, MISCELLANEOUS STUDIES IN THE COLEOPTERA, II 163
FERRIS AND NISSEN, LARVA OF A SPECIES OF THE CASSIDIDÆ 169
HOOD, SYNONYMY OF SOME THYSANOPTERA 173
TANNER, ORTHOPTERA AND DERMAPTERA FROM UTAH 178
GAHAN, DESCRIPTION OF A NEW MYMARIDÆ 180
SPRUYT, NOTES ON ALAPTUS PSOCIDIVORUS GAHAN 182
KNOWLTON, NOTES ON A FEW AMPHOROPHORA 185
HARDY AND PREECE, FURTHER NOTES ON SOME SPECIES OF CERAMBYCIDÆ 187
ESSIG, INSECTS FROM THE ADOBE WALLS OF THE OLD MISSIONS OF LOWER CALIFORNIA 194
WOODWORTH, TILLYARD'S INSECTS OF AUSTRALIA AND NEW ZEALAND . . 195
VAN DYKE, THE SPECIES OF AMPHIZOA 197
KNOWLTON, A NEW WILLOW APHID FROM UTAH 199
EDITORIAL 200
INDEX TO VOLUME III 201

San Francisco, California
1927

THE PAN-PACIFIC ENTOMOLOGIST

Published quarterly in July, October, January and April by the Pacific Coast Entomological Society in co-operation with the California Academy of Sciences.

Annual subscription $2.00 in advance for the United States and Canada; $2.25 for foreign countries. Subscriptions should be sent to the treasurer, Dr. Stanley B. Freeborn, University Farm, Davis, California. Make checks payable to the "Pan-Pacific Entomologist."

Manuscripts for publication and communications regarding non-receipt of numbers, change of address, requests for sample copies, etc., should be addressed to the editor, Mr. E. P. Van Duzee, California Academy of Sciences, Golden Gate Park, San Francisco, California. Advertisements will be accepted for the back cover pages. For rates address the editor or treasurer.

Twenty-five copies of author's extras will be furnished free on request. Additional copies will be supplied at cost of publication if a request is received with the manuscript.

Subscribers failing to receive their numbers will please notify the editor at as early a date as possible.

PUBLICATION COMMITTEE, PAN-PACIFIC ENTOMOLOGIST

E. O. Essig, *Chairman*

G. F. Ferris — R. A. Doane

E. C. Van Dyke — Grant Wallace

REGIONAL MEMBERS

W. W. Henderson, Logan, Utah

J. C. Chamberlin, Riverside, California

E. P. Van Duzee, *Editor*

E. C. Van Dyke, *Associate Editor*

S. B. Freeborn, *Treasurer*

Published at the California Academy of Sciences, Golden Gate Park, San Francisco, California.

Entered as second-class matter, February 10, 1925, at the postoffice at San Francisco, California, under Act of August 24, 1912.